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STONE.

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ALPHABETICAL INDEX TO ADVERTISERS.

GOSFORD HOUSE, SCOTLAND, SHOWING USE OF ENGLISH ALABASTER, CAEN STONE, AND ITALIAN ISTRIAN STONE.

STONE

VOL. XXIV. NUMBER 1.

PREHISTORIC SCULPTORS OF STONE.

AMONG the most interesting of the discoveries made by the scientists who devote their time to researches into the Palæolithic ages—thousands of years before recorded history begins—are those which prove that even in those dim and distant ages man, such as he was, had æsthetic yearnings. One of the most important of such discoveries has been made in France, in the grotto of Combarelles, near Eyzies, in Dordogne. The discovery was communicated to the Academie des Sciences by Messrs. Capitan and Breuil, and was accompanied by drawings of certain figures of animals engraved on the walls of the grotto on each side of its length. An account of these rude sculptures is given in the London Daily Graphic. The figures are in some places quite deeply engraved in the rock; in others they are only scratched; here and there is an effort to give a relief to the sketches.

It was at once evident to the discoverers that these remarkable rock drawings were identical in character with those on fragments of bone and horn of which casts may be seen in the British Museum, and that the same striving after truth in rendering the characteristics of the animals was to be seen in the grotto of Combarelles; proving the familiarity of the artist with the appearance of the animals themselves, so that the artist was contemporary with the animal he drew. Now one of these animals being a hairy mammoth and the other a reindeer, it is evident that when those creatures roamed the hills and valleys of South Central France man was also there—that is to say, in the Palæolithic or Older Stone Age.

"The precision with which the figures are drawn," says the discoverers, "allows us to recognize the species of the animals so represented. The equine types are sometimes large-headed, with short, stiff manes—sometimes with flowing manes and tails. Some of the horses were domestic animals. One of them has on its back a covering—a palæolithic horse cloth—others have traces of bits and halters. The bovine types are less frequent; one of them has the character of certain African antelopes (such as the gnu), while another is much like our oxen of to-day. The running reindeer is identical in character with those which are engraved on bone and of the same period.

The representations of the mammoth (of which fourteen were exhibited to the Academie des Sciences) are very characteristic. Some are more hairy than others."

With these rock drawings are strange signs engraved in the rock; a circle with the semblance of human features, a double outlined lozenge on the middle of the body of one of the horses, others of M-like shape, semicircles, etc., all of mysterious and unknown significance. Since the memorable day when the first piece of engraved bone was discovered, embedded in the stalagmite of the caverns once tenanted by human beings, there has been no discovery which has caused so great an interest as this one in the stalagmite cavern of Combarelles. We have in these rude and yet skilful efforts of the human race deeply interesting evidence that man once shared with mammoth and with reindeer the Arctic plains of southern France.

BUILDING STONE IN SYRACUSE UNIVERSITY BUILDINGS.

SYRACUSE UNIVERSITY now has five stone and two brick buildings on the campus on University Hill, one brick building adjoining the campus and two brick buildings down in the city.

The last building to be completed was first opened for class work a few weeks ago. It is the Smith College of Applied Science, a handsome gray stone building, donated to the University by the Hon. Lyman C. Smith, the proprietor of the prosperous Smith-Premier Typewriter factory. The building is 133 feet long, 56 feet wide, and 82 feet high. It contains four stories and a finished basement, which latter is devoted to machinery, heating plant, and mechanical laboratories. The first story contains the shops, the second and third stories the lecture and class rooms, and the fourth floor, which is one well-lighted large room, is devoted entirely to drafting.

The basement is constructed of the native Onondaga limestone obtained from the quarries near the city. The superstructure consists entirely of the famous Cleveland sandstone, furnished by the Cleveland Company. The walls are rock-faced masonry with fine tool-dressed stone of the same kind for trimmings and surmounted by a red tile roof. The graceful columns and carved stonework at the entrance are also the Cleveland stone. The artistic and architectural effect is quite pleasing. The contrast between the rock-faced walls and the lighter tool-dressed trimmings is such as to catch the eye without making itself unduly obtrusive. The light gray and fine grain of the superstructure appropriately surmounts the deeper gray and coarser grained, more massive looking limestone of the basement. The stone was received on the campus in rough blocks from the quarry and the cutting and dressing were done at the building. The work was begun in the early spring of 1901 and the building was ready for use at the beginning of this year.

The Esther Baker Steele Hall of Physics, completed in 1898, is the next newest building. It is 130 x 70 feet and is at present occupied by the departments of physics and biology. It contains three stories and a well

finished basement which contains the machine shops. The entire building, basement and superstructure, is constructed of rock-faced native Onondaga limestone. The building is a gift from Mrs. Steele.

The Holden observatory, a small stone building standing midway between the Hall of Physics and the college of Fine Arts, is likewise built of the Onondaga limestone.

The Hall of Languages of the college of Liberal Arts, centrally located on the north side of the campus, is the oldest building on the grounds. It is 180 x 96 feet outside dimensions and four stories high, including the well lighted basement. It is constructed entirely of the native gray Onon-

MAIN BUILDING—SMITH COLLEGE OF APPLIED SCIENCE.

daga limestone, and with its projecting tool-dressed cornices and trimmings, it presents a very handsome appearance. Standing as it does at the head of the beautiful University Avenue, it forms an appropriate nucleus for the buildings now grouped around it.

The beautiful John Crouse Memorial College, containing the Fine Arts College, is the largest, handsomest, and most imposing building on the campus. It is 190 x 162 ft. and four stories high. It stands in a commanding position on the northwest corner of the campus on the top of a steep slope 60 ft. above the level of the terrace, marking the shore line of old Lake Iroquois. The view from this building is very attractive, to the west and north looking out over the city of Syracuse, the many railway lines, the Erie Canal, Onondaga Lake and the low rolling country to the north; towards the south it overlooks the beautiful Onondaga valley for a number of miles, and in the distance numerous cliffs and bold hills of the plateau region.

The basement and ground trimmings of Crouse College are constructed of pink granite. The superstructure consists of the famous New England

brownstone, so well known in New York and other eastern cities. The brownstone came from the large quarries in the Connecticut valley at Longmeadow, Mass. The building is covered with a black slate roof.

The brownstone stands out in strong relief with the sky for a background. The building, standing as it does on such a commanding eminence, is plainly visible from long distances away, and is certainly a handsome college building.

A near view of the building is slightly marred by the appearance of "whitewash," a white efflorescence coating the stone in spots and patches, a defect which is more conspicuous on the north and east sides of the building.

The Gymnasium and Library buildings are both constructed of brick,

HOLDEN OBSERVATORY.

but as they are entirely too small to accommodate the greatly increased attendance at the University, both of them will probably be replaced by new and larger structures.

The Onondago limestone which is used in most of these buildings is one of the best building stones of the Empire State and has been used quite extensively for building and ornamental purposes in Central New York. A more detailed and illustrated description of some of the geological

and commercial features of this valuable stone will be presented to the readers of STONE in a future number.

The building stones above mentioned represent three different geological periods. The Onondaga limestone is from the lower part of the Devonian,

JOHN CROUSE COLLEGE OF FINE ARTS.

the Cleveland stone is from the Berea group in the Lower Carboniferous period, and the Connecticut brownstone is from the Triassic period. There is also some blue limestone from the Lower Helderberg division of the Upper Silurian used in the basement of two of the buildings.

T. C. HOPKINS.

ANCIENT USE OF ENAMELLED TILES IN ARCHITECTURE.*

THE Egyptians were the first to discover a stone that would stand glazing, and they used glazed wall decoration extensively. The Tell-el-Yahoudi plaques are to all intents and purposes wall tiles, and their date is 1400 B. C., and Dr. Flinders Petrie has discovered glazed wall tiles of a still earlier date amongst the ruins of the palace erected by Ku-en-aten in his newly-found capital. The colors mostly have disappeared, owing to the action of the damp during the centuries wherein they lay buried. When the Egyptians used polychrome decoration on their plaques, the different colors were let into the object, making it a kind of tile mosaic—not painting, as in a picture, on the surface.

The discoveries at Susa mark an advance in the art of wall decoration.

*Extract from a paper read before the Society of Arts, London.

During the Achæmenian dynasty the royal palace had its walls adorned with panels of painted plaques, but these were rather bricks than tiles, and the methods employed were derived from the glazed bricks employed in the architecture of the Babylonian and Assyrian empires. The walls were built of light gray and light rose, unglazed, bricks ranged somewhat like the walls of the Ducal Palace at Venice, whilst the ornamented parts, which were the portals and great entrance staircases, were in enamelled terra-cotta bricks, the colors being separated by what appears to be a vitreous wall, something after the manner of the metal walls of cloisonne enamels. Darius gave up the use of terra-cotta and employed a kind of concrete for his bricks because he found the enamel wore better on the latter.

From Susa it is but a short step into Persia. In Mesopotamia the Medes built the town of Ecbatana. Up the sides of a steep hill rose the seven circular walls, one inside the other, enfolding the treasury and the king's palace. The outer wall was of immense diameter, and the terraces enclosed by each ring carried collections of country houses with small farms and gardens at-

STEELE HALL OF PHYSICS, SYRACUSE UNIVERSITY.

tached, rather than the suburb building to which we are accustomed. The city was consecrated to the great powers of the firmament, and the devotion of its founders was registered in the form and color of its walls. The battlements to the outer wall were white, to the next black, the third scarlet, the fourth blue, the fifth orange. The two last walls had their battlements silvered and gilt. Returning from an expedition or from the chase there stood before the eyes of the beholder the city of his home, voicing in its chord of

color the seven great orbs that guarded his family and hearth—the sun, the moon and the five planets—who rose and set in ceaseless vigilance to call him to action, to give him rest, to bring forth meat for him and the kindly fruits of the earth; and when the fever of life was over to proclaim to him by their silent march overhead through the vault of heaven the immeasurable might of fate and the tranquillity of the grave.

This profusion of color and metalwork strikes us as extravagant even in conception, not to speak of realization; but in Herodotus's time he was writ-

HALL OF LANGUAGES, SYRACUSE UNIVERSITY.

ing of facts well known to many of his readers who had seen Nineveh and Babylon and the pictured splendor of Egypt; and this is how he describes Echatana. Amidst this wealth of artificial color grew up the art of Persia as we know it, and its influence throughout the past has been very subtle and far-reaching. It has colored India and the shores of the Mediterranean. It is impossible to look at the Moorish work of North Africa and of Spain and not feel the Persian influence exhibited; nay more, most of the work must have been done by actual Persians carried in the train of Arab conquerors. The art of Byzantium played upon it and probably deeply influenced it, but our knowledge of Byzantine art is at present too imperfect to let us pronounce definitely in this direction. The stream of merchandise that flowed through Persia brought with it samples of the porcelains from far Cathay, and after a certain date Chinese influence on the Persian potter is very perceptible. In China colored tiles are largely used in exterior work. The "Porcelain" tower at Nankin (destroyed 1853) was so called because the

lowest of nine stories was covered with glazed brick, the eaves over the balconies were roofed in with green tiles and the window jambs plated with glazed porcelain modelled in relief.

In the Middle Ages, and outside the sphere of Persian art, there was tile-making—but the tiles so made were for pavements and later on for roof coverings. The floor tiles were made glazed, but the glaze soon wore away. Innumerable examples of these abound in England and on the Continent, made, I imagine, to reproduce as well as might be the splendors of the marble pavements abroad, about which the pilgrims spoke when they returned from Rome and Byzantium or from their crusades in Paynim lands. When the revival of letters and classic love and antique art set in, every craft was touched by its influence, and pottery had its Renaissance as well as sculpture. But the tile-makers drew their new inspirations not so much directly from the past as from Spain, and thus in this roundabout way came under the influence of Persia. The Arabs invaded the Peninsula of Spain, A. D. 711, and remained there, so far as their influence of the tile trade is concerned, till 1610. The Alhambra was begun in 1272, and the tiles that decorate it are the oldest and most interesting in Spain. Their repute widened, and Spanish tiles spread far and wide; they were imported in considerable quantities to Genoa, to Naples, and to the islands westward of the Peninsula of Italy, and in company with the European craftsmen found a market in India.

During the period of the Renaissance various attempts were made to develop the qualities of glazed ware in the direction of architectural employment, the work of the Della Robbia family being the products perhaps the most generally known. Famous factories were established at Florence, Faenza, Gubbio and many other places under Italian rule; and under the Spanish is the Baleric Isles, and at Naples. So famous were they, that they gave a name to their ware that lasts to this day. Faience is Faenza ware, Majolica is the pottery that comes from Majorca. In the Spanish Peninsula, the Renaissance found a special state of affairs. To the south, in what was once the Sultanate of Cordova, Moorish traditions and Moorish craftsmen still lingered on, distinct from the Christian workers who were absorbing their territory; and these rival potters had occasionally blended, so that besides the Christian and the Moresco styles, there was a third style that went by the name of Mudejar. It was not till the time of the Great Emperor Charles that the influence of the Renaissance began to show on Spanish work —the painted tiles date from the sixteenth century. Talavera was then the famous emporium, and its goods supplied the country, Portugal and the far East.

In England, glazed plaques, other than paving tiles, are rare. There is an interesting specimen in Lingfield Church, Surrey, an effigy of the time of Henry VIII. in glazed tiles. The figure is incised on a rather coarse red clay covered with a greenish glaze now much worn away. It is supposed, however, that the tiles are of Flemish origin. Similar instances of sepulchral portraiture are fairly common in France.

By the time we are reaching the sixteenth century tiles in Europe—except for pavings and skirtings—are ceasing to be architectural adjuncts,

and becoming—or trying to become—more and more tile pictures. It was the flood-tide of the painters and painters who prided themselves on their versatility. Every material was pressed into their service, mosaic, stained glass, tiles, pots, plates and dishes—all were to come out as pictures regardless of the qualifications and the limitations of the material. In Spain, the Spanish Netherlands and the two Sicilies this picture-painting was taken

MODERN USE OF ORIENTAL MOTIFS IN TILING—INDIAN ROOM, HOTEL CECIL, LONDON.

light-heartedly—the humors of the material were allowed to have their say, and there is a general air of not being on your oath in the treatment of these panels. If you recall the subject of a set of Dutch tiles you will see a kind of ease in the handling and a liberal acceptance of the imperfections of the ware, altogether different from the tense serious treatment of a Maestro Giorgio tazza. The result is that these (to use the loose and inaccurate

but generally accepted appellation) Dutch and Spanish tiles persist to this day as living things, while the solemn works of art are to be found now only in museums; and we can observe how hopelessly dead the art of them has become, by the imitations of them that are being here and there manufactured. These finished picture tiles fulfilled no real want; and as soon as the great burst of enthusiastic appreciation of all forms of craft was over, and the wave of studio excellence abated, they dropped out of circulation. Nobody would have—of such things—any but of the very best, and the very best were not being made. Even the other, more homely, efforts shared in this discouragement and soon sank to a serviceable level, such as lining dark walls and those surfaces that were likely to get discolored by smoke and dirt; and on these terms are made and used to this day. The high standard of draughtsmanship and design had this disadvantage, that the artist to gain this excellence, had to devote his whole force and attention to the pictorial side of his craft and so become divorced from his material. The tile was no longer treated on its own merits, and its decoration evolved therefrom, but as a field for the painter's display, and to secure effects which, though proper and natural in frescoes and easel pictures, are foreign to the nature of a tile, and can only be extorted—and then but partially—by the utmost technical ability.

In the East and that part of Europe under Persian influence—as regards the potter's craft—the aim was different. The qualities of the clays and glass were accepted as the basis for development and improvement, and all advance, both in the substance and the technique, was evolved from the tile itself. Nor was the standard pitched either too rigidly or on too high a plane. The ideal was not beyond the reach of the craftsman, and there was no thought of the presence of some superior imported personage who should invest, with the garniture of art, the product of the potter's labor; and yet on those terms we have examples of consummate work—supreme in technique and in beauty. And this art is still alive, and if it could be left undisturbed would go on quietly fulfilling its purpose. Unfortunately the restless activity of modern life, with its eager but ignorant appreciation of foreign work, is battering at its door, and we are all busied by our patronage to change "the changeless East." European—and, I am afraid, English—influence has, in its blind admiration for the art of Japan, ruined it. It set up a huge and feverish demand, and the Japanese at once set themselves in haste to satisfy it. Other nations in the East are not so mercurial and consequently have not been so much affected, but they have not been uninfluenced. Both India and Persia, not to speak of other countries, have set themselves to serve the British markets and to conform to British standards. It may be inevitable—it is certainly disastrous. It is sad to think, with all our good intentions, how destructive we are of all those qualities we talk so glibly about, destructive because we are ignorant of what is the essence and purpose of the qualities we call beauty and art.

HALSEY RICARDO.

THE MARBLES OF GREECE.*

GREECE is very rich in deposite of architectural and sculptural marble, of divers grain, durability, and color. In addition to the quarries worked by private owners, the mining of this valuable stone has of late years been carried on by two English companies and one Grecian company.

Pentelikon marble is the most important variety of Grecian white marble. It has furnished the material for all sculptural and architectural purposes during a number of years, and is won both in ancient and new quarries. The modern marble quarries at Kokkinaras, to the east of Kephissia, contain the so-called "upper marble," which is bluish grey in color, and frequently grey-streaked; and the "under marble," separated from the upper by micaceous shale, and forming a bed of white marble 500 metres thick. All the dwellings of modern Athens are built of this stone, some of them being in the ancient Greek style, others in Renaissance; and the towns of

GREEK CIPOLLINO QUARRY, WORKED BY MESSRS. FARMER & BRINDLEY.

Athens and Piraeus consume about 2,500-3,000 cubic metres every year. In the southwestern portion of the Pentelikon district are the ancient quarries whence the old Greeks and Romans took the beautiful marble from which their sculptures, monuments, statues, and buildings were made; and the material for the new palace of King Otho, erected in 1835, was

*Zeitschrift für das Berg-, Hütten- und Salinenwesen, translated by "The Quarry," of London.

derived from the same source, as was also the marble used in building the Academy of Science, the University, the Vallian Library, the Arsakion School, the Museum, the Polytechnic School, the Catholic Church of St. Dionysio, the palace of the Crown Prince, the Zappion Exhibition, the Bank of Athens, part of the restored Stadium a number of memorials, private mansions, &c., &c.

The English Company, Marmor, Limited, has leased the Pentelikon marble quarries, and has also large quarries at Hagios Dionysos, on the northern side of the main range and opposite Stamatovouni. The marble blocks are conveyed from the quarries, at an altitude of 900 metres, to the Kephissia station, on the Attic railway, by means of wire tramways, narrow-gauge trucks, and a railway 11 kilometres in length. At Mount Pentelikon and Stamatovouni the marble is cut in blocks out of the rock by means of wire ropes set in motion by locomotive engines, this method precluding the risk of cracking the marble. By this means, blocks measuring $7.90 \times 1.15 \times 0.69 = 6.268$ cubic metres, were recently prepared for the building of the National Bank and the restoration of the Parthenon; and the block cut for the Moltke statue had a measurement of 26 cubic metres in the rough. The company reckons on a yearly output of 12,000 cubic metres and over. Large sawing machines for cutting the marble into plates are in course of erection at the station at Hagios Dionysos. The same company is opening up new quarries for winning white marble in Paros (except the Lychnites from the Grotto of Nymphs), the black Arcadian marble, the green Tinos marble (Verde antico), colored Latomi marble, white Skyros (Colonna) marble, Cipollino from Karystos, and the red Mani marble (Rosso antico).

The Grecian Marble Company was founded in 1899, and acquired the Parokia sawmills and the St. Minas quarries at Paros, belonging to the bankrupt Paros Co., as well as the ancient quarries to the north of Naxos. The marble of these quarries, at which the half-finished colossal statue of Apollo is to be seen, is white, with a tinge of pale grey, and is partly coarse, partly fine, in the grain. The strata dip at an angle of 30 degrees to the east, and the cutting surfaces are perpendicular to the stratification, a circumstance greatly facilitating the recovery of large blocks. Over 200 cubic metres of marble have been quarried, and conveyed to the mole by a narrow gauge track for shipment to Parokia, where it is sawn up. The company reckons on an annual output of 40,000 sq. metres of plates. The same company also owns quarries of white and colored marble at Antiparos, and of green marble at Tinos.

The extremely pure, snow white statuary marble at Hagios Minas was known to the ancients as Lychnites, because it was mined by lamplight in the underground workings. It occurs as a bed, 1½-4 metres thick, between deposits of pale grey coarse-grained building marble, and extends for a distance of 600 metres in a direction from N.E. to S.W. On the southwest side is the underground grotto of Pan, and on the northwest are the grottoes of Hermes and the Nymphs. The marble strata rest on micaceous shales, and these again on gneiss. A powerful upheaval has occurred from northeast towards the southwest, whereby both the grey and

the white marble have been so fissured that it is impossible to procure sound blocks of any great size. Attempts were made in 1879 to work the two kinds of marble, and the company formed for that purpose built a small harbor at Parökia, erected steam-sawing plant, constructed a railway 10 kilometres in length, to the St. Minas quarries, where a steam engine was

QUARRY FACE IN THE CIPOLLINO QUARRY OF MESSRS. FARMER & BRINDLEY.

put into position for compressing air to win the marble, and a long inclined tunnel, 139 metres in length, was projected, to run in a northeast direction as far as the grotto of Hermes.

However, the marble blocks left by the ancients in this grotto were in such a fissured state that they could not be utilized, and the preliminary works mentioned above exhausted the resources of the company before the true Lychnite was reached. Before the works were shut down, the author recommended the opening up of the Nymphs' grotto, believing the true entrance to the Lychnite mine would be found at the position occupied by the Nymph bas-relief. The driving of a sloping tunnel through the ancient waste, for a distance of 144 meters, in a direction west-north-west, led to the striking of the ancient workings at a depth of 63 metres below the bed of the valley. An ancient surveying mark was discovered, and it was found that, at this point, the bed of Lychnite remained intact and extended into the depths at a sharp angle. The Lychnite was of excellent

quality and milk white in color, with a pale flesh tint in places. Unfortunately, however, it was not free from fissures, and the blocks did not exceed 0.3 × 0.8 cubic metres in size (1.15-1.30 metres in height), so that they were only fit for busts or small statues. From this material the sculptor Broutos executed the statues of Paris, Achilles, and Minerva, which are translucent in the light. The Lychnite on the southwest side of the workings seems to be less affected by fractures and fissures. The immense heaps of waste occupying the old workings indicate that the first trimming of the blocks was effected *in situ;* and the dimensions of the chambers show that the ancients must have taken out about 25,000 cubic metres of marble from the Nymphs' grotto alone. At the present time the working of the Lychnite deposit has ceased, but the author is of opinion that it could be profitably resumed, in the Nymphs' grotto at least, and a further supply of this valuable stone placed at the disposal of modern sculptors. The material is

ANCIENT WORKINGS IN THE CIPOLLINO QUARRY.

softer and easier to work than the Pentelikon marble, and is free from the stains found in the latter.

THE VERDE ANTICO MARBLE CO., LTD.—The ancient quarries of Karatchair, from which monoliths several metres in length were formerly obtained, are situated at an altitude of about 100 metres above the plain, near the village of Kassamboli, in Thessaly, 1½ hours' journey from

Larissa. The stone here consists of a peculiar non-stratified ophicalcite-breccia, which is embedded in shales and overlaid with limestone. When polished, the markings of this stone acquire a more beautiful appearance than the analogous ophicalcite (Verde antico) from Tinos. The monoliths of Hagia Sophia, at Constantinople, St. Paul and St. John Lateran, at Rome, and others, were taken from this quarry. The present company began to work the quarries in 1896, cutting the stone with wire ropes, as is done at Pentelikon. Operations are confined to the winter season, the district being unhealthy in summer, and the output is about 45-50 cubic metres a month. Over 20 monoliths, 4 metres high, have been shipped to London for church architecture. The stone is sent to Volo and conveyed thence by sailing vessels to Leghorn, for shipment to America.

Cipollino.—This beautiful whitish green marble is obtained from Brindley's quarries at Styra. When ground and polished it frequently exhibits belts and stripes of alternating colors.

The other known deposits of marble in Greece are as follow:—

At Lakki there is an ancient quarry yielding white marble of coarse grain, similar to Lychnites; this is worked by an English company.

At Nausa and Levkes are unworked beds of beautiful white fine-grained marble; and yellowish marble is found in southern Paros.

At Apollonia (Naxos) the Grecian company works large beds of fine and coarse-grained marble, which is sent to Parokia to be sawn into plates.

At Tinos is quarried a white marble, occasionally traversed by bluish veins (Turkino), or colored leek green by blackish serpentine. Verde antico is mined at Panormos, from which quarry the monoliths, six metres in length, for the new Catholic church of St. Dionysios, at Athens, were obtained. A dark grey (so-called "black") marble is found at Tinos, and a similar stone at Naxos, on the western slope of Mount Ozias.

At Kallisti (Thera) is an unworked black-spotted marble.

At Skyros, a beautiful pure white marble, and some with black and grey spots, similar to Carrara marble, are worked at Colonna. The most important ancient quarries on the island, yielding colored and spotted marbles, are situated at Papajanni and Latomi. The English company has quarries at Tris Bukkaes, Oros, and on the island of Valaska; the marble is striped and spotted with yellow, red and brown, but, unfortunately, is seldom found in large blocks. In the olden times a great deal of this marble was sent to Rome.

In Euboea, the ancient, but unworked, quarries at Mount Ocha contain large monolith pillars; the marble is greenish grey in color. At Styros are the largest of all the ancient quarries in Greece; the stone is Karystos marble (micaceous marble or Cipollino), white matrix with yellow and blackish leek-green stripes.

In Attica, the ancient Pentelikon quarries, now unworked, contain snow-white to milk-white stone. That in the caverns contains fine embedded particles of mica, and is unsuitable for structures exposed to the weather. The modern quarries at Kokkinara furnish bluish grey, clouded and streaked marble; that at Valhyrevma yields white marble, rarely spotted.

Most of the new buildings at Athens and Piræus are constructed of this stone.

Hymettos marble is streaked with black, and is vitreous and brittle; that of Stavros is clouded with white and blue.

A number of white and colored marbles are found in the vicinity of Athens, at Pnyx, Podarades, H. Marini, etc. Experience gained in quarrying these marbles has shown that the stone is whiter and more fully crystalline the further northward over the Pentelicon from Hymettos.

At Laurion, in the neighborhood of Agriliesa, are ancient quarries that supplied the marble for the pillars in the temple of Sunion; there are also ancient quarries at Thoriko.

In the Poloponnesus unworked deposits are found at Doliana—white and bluish grey, suitable for ordinary architectural purposes; Tripolitza—blackish grey lime with imprints of fossil mussels; and Kapsia (near the ancient Mantinea), a black marble that takes a beautiful polish. Ancient quarries in the Cape Matapan peninsula (Taenaron) and the district of Mani have been reopened by Marmor, Ltd.

Worked deposits in the same province are: Dimaristika, yielding grey marble spotted with white, black, and green. The valued red marble (rosso antiko) of the ancients was obtained from Hagios Ilias, in this neighborhood; Kastri, brownish red and white, an inferior kind of rosso antiko; Scutari, red (rosso antiko); Marmari, green, and green and white marble; Archontii, green and white similar to Campan vert; Cypriano (the harbor of Hagios Ilias), pale red marble; Taenaron and Kisternae, a handsome red marble, which furnished the red blocks for the memorial erected in England to Lord Byron.

In Thessaly a pale grey marble is worked at Demetrias, near Volos, and a coarse-grained marble at Trikeri; whilst an unworked deposit of white marble occurs in the valley of Tempe.

The actual figures relating to the production and export of Grecian marble are difficult to obtain, but it is estimated that 2,500—3,000 cubic metres of Pentelikon marble are disposed of annually in Athens and Piræus, the total value being 375,000 drachmae; the English company alone disposed of 1,500 cubic metres.

Granite.—This stone is found in various parts of Greece, but only one of the deposits is worked, namely, that at Mykonos (Cape Turlo, near Panorma); this is traversed by veins of iron, lead, and heavy spar. Near the village of Komi (Tinos) are ancient quarries of fine grained greyish white granite, from which monolith pillars could be obtained. At Seriphos there is a hard fine-grained granite that offers great resistance to the influence of the weather, and would furnish good road metal and millstones. Granite is also found at Mount Korona, near Angaries (Naxos), a coarse-grained stone; at Kastro (Delos); at the Katopaliani monastery and St. Hypakoe (Paros); at Anaphi, traversed by veins of lead glance; at Hagios Johannis of Pyrgon (Jos); and at Plaka (Laurion), where it forms the matrix of the ore deposits, and is occasionally traversed by small veins of Wulfenite (yellow lead ore).

PORPHYRY.—At Levetsova, near the ancient Krokeae, between Sparta and Gythion, are old quarries of Labrador porphyrite, dense olive green masses of felsite with crystals of felspar, forming lode-like masses in micaceous shale. This stone was the renowned decorative building stone known to the Romans as "Lacedæmonian marble" (Porfido verde antico). It is hard and breaks in small fragments.

SERPENTINE.—This rock is widely distributed throughout Greece. At Palaopolis (Tinos) is the precious serpentine, blackish green in color, with pale green veins, quarried by the ancients, and worked as Ophites.

A. CORDELLA.

HOLSTON MARBLE OF EASTERN TENNESSEE.

IN the description of the geology of the Maynardville Atlas sheet, just published as a geological folio by the U. S. Geological Survey, Mr. Arthur Keith gives an interesting account of the Holston marble of that region.

The Maynardville Atlas sheet covers an area of 963 square miles, and includes portions of Knox, Sevier, Anderson, Campbell, Union, Claiborne, Grainger, and Jefferson counties, all of which lie in the eastern portion of the State.

The Holston marble occurs in the formation known to geologists as the Chicamauga limestone. The marble is not everywhere present where this limestone occurs, but has been found in great quantities in three belts crossing the southern portion of the area in a northeast-southwest direction. The distribution of the marble and the location of the quarries is shown on the excellent geological maps included in the folio.

The total thickness of the marble beds is in places as great as 300 feet, but by no means the whole of this is available for commercial use. Workable beds are rarely as thick as 50 feet, and usually in that thickness there is a combination of several varieties. Variations in the character of the marbles are due to differences in the sediments at the time of their deposition. Carbonate of lime, iron oxide or hydrate, and clay were deposited together with calcareous shells of animals. The firmness of the rock is due to its having a large proportion of lime, while the rich, dark colors are produced by the oxide of iron. The colors vary from white to cream, yellow brown, chocolate, red, pink, gray, and blue in endless variety. The colors may be either uniform throughout the rock, or grouped into separate crystals or patches of crystals. The curious and fantastic arrangement of the colors is one of the chief beauties of the stone. The larger portion of the marble is of a distinctly reddish or chocolate color, though in the northern portion of its area blue and gray tints are common. All of the marble is free from siliceous impurity and, when otherwise reasonably pure, takes a good polish and is not affected by the weather.

When clay is present in large proportions the stone becomes a worthless shale. Iron oxide is likewise an impurity, and is undesirable in large quantities. Slight changes in the relative amounts of the component materials

result in important changes for good or bad in the character of the marble. Such changes are common in the deposition of all sediments and must be expected to occur in any thick bed of limestone. The changes are sometimes rapid, a good bed frequently becoming poor or a poor bed good in a short distance. Quarries separated from one another have different series of beds, and each quarry has its own special varieties.

The marble as it usually occurs is found to be but little altered by the action of the weather. The pure varieties are nearly as solid at the surface as at great depths. Solution, however, has produced holes and caves down to the level of the surface streams. These openings are sometimes of aid to the quarryman in his attack on the rock, but they represent a loss of much valuable stone.

The marble is well fitted for withstanding the weather, as absorption tests show that all the better grades are highly impervious to water. The crushing strength of the purer layers is also very high, a number of samples giving an average strength of 16,000 pounds per square inch.

The location of quarries is dependent somewhat upon the dip, but as this is usually steep the amount of stripping is not great. Near Holston the marble is some distance above water level, but further north the marble usually occupies the bottom of the valleys and the drainage of the quarries becomes a troublesome problem. Even in the more elevated quarries, trouble is frequently caused by the entrance of water from springs and underground streams.

M. L. F.

THE STONE INDUSTRY OF THE UNITED STATES.

FOURTH ARTICLE.

OKLAHOMA is just beginning its stone production, the output for 1900, all in limestone, being valued at $25,586. This is just half of the production for 1899, but it is a great increase from the $3,000 which marked the value of the output in 1898 when the territory first figured in stone production. Most of the stone was used for paving and road-making, the value of that used for building purposes being only $2,672. That the territory has extensive and excellent deposits of stone is apparent from the article published in these columns a few months ago and written by Prof. Charles Newton Gould of the University of Oklahoma. The great wealth of the territory is in its immense deposits of gypsum, which will undoubtedly be developed in the near future.

Oregon must be given the place at the foot of all the states in the matter of its stone production, only New Mexico having a smaller output. The value of the product in 1900 was $21,663, half of which was in limestone, and the rest made up equally of granite and sandstone. The value of the granite was $5,313, of which $993 was sold in the rough; $1,500 was dressed for building purposes; $2,500 was dressed for monumental purposes, and $320 made into paving blocks. The sandstone was valued at $5,450, of which $4,800 was sold in the rough, $155 was dressed for build-

ing purposes, and $55 sold for curbing and flagstone. The limestone output, valued at $10,900, shows a fair increase over the two preceding years. Virtually the entire output was burned into lime. The stone industry shows no signs of activity in this state, and it will evidently be years before it assumes any importance.

Not only does Pennsylvania continue at the head of the stone producing states, but its output is almost double that of its nearest competitor, Vermont. The value of the stone production reached the enormous total of $8,104,675. Trap rock, valued at $276,084, formed the greater part of the granite output of the state in 1900. The value of the granite was $120,187, making a total of $396,271. This was a slight increase over the previous year, all in trap rock, as the production of granite was a little less. Of the latter stone there was sold in the rough $71,454; dressed for building purposes, $14,761; dressed for monumental work, $507; made into paving blocks, $13,189; curbing, $10,664. Including the trap rock, there was crushed for roads $285,296. The state was third in sandstone production, with a total of $1,050,248, of which $281,454 was for bluestone, and $768,-794 for sandstone proper. This showed the enormous gain of $333,195 over the figures for the preceding year. Of the output, $247,586 was sold in the rough; $412,633 was dressed for building purposes; $243,118 was sold for curbing and flagstone, and $6,927 was made into grindstones and whetstones. Pennsylvania had a slate production of $2,713,598, more than equal to the entire output of all the other states combined. There has been a steady growth in this industry for some years past. Most of the output, to the value of $2,277,192, was in roofing slate, leaving only $436,406 for other varieties. The state produced marble to the value of $151,167, a great increase from $39,373, which represented the value of the output two years previous. Of the marble there was sold in the rough, $16,056; for building, $102,904; for cemetery purposes, $10,003, and for interior work, $8,000. Nearly half of Pennsylvania's stone output was in limestone, which had a total value of $3,800,318, much the largest in its history. There was used for building purposes, $128,997; used for paving and roadmaking, $684,983; riprap, $660; made into lime, $910,903; sold to lime burners, $21,799; used for flux, $1,949,859, and for other purposes, $103,117. The increase in the production of limestone over the previous year, amounting to $711,735, was almost wholly in the amount used for flux. There was a considerable falling off in the amount of lime burned, but not enough to prevent the state from easily ranking first in lime production. The cause of the decrease was due chiefly to the high price of coal. Farmers who depended upon coal for fuel in burning lime were unable to keep their kilns running. Much of the lime burned in this state is used by the farmers on their land and is burned for this purpose alone. When the figures for the past year are available it will doubtless be found that the stone industry in all of its branches in Pennsylvania has shown a marked growth. The sandstone of the state is admirably suited for building purposes, and is deservedly popular. The bluestone production is steadily growing, and the state has immense deposits from which to draw. This stone, which

is unrivalled for certain purposes, is produced only in New York and Pennsylvania. In the latter state, as in the former, the production is largely in the hands of farmers, and the majority of quarries lack adequate equipment. There are a few progressive firms in the field, and with the growth in the demand for the stone it may be expected that the producers will find the necessity for bringing their quarries more nearly up to date. The past year has shown an absolutely unprecedented activity in the slate region. The old quarries have been rushed with orders and have worked to their fullest capacity, and a number of quarries that have been idle for years have started up again. The export trade was large, owing to labor troubles abroad. The outlook is very favorable in the way of marble. The Unfading Blue, which has long been used with good effect in building, is now meeting with decided appreciation for monumental purposes. There are wonderful deposits of serpentine in the vicinity of Easton, very little worked as yet, but certain to come upon the market the coming year. The deposit is unique in that it contains, aside from the regulation serpentine, a combination of serpentine and rose dolomite, giving the much desired union of red and green. With the tremendous development of the iron and steel industry in Pennsylvania, there is no fear for the future of limestone production. There have recently been various combinations among the large quarries that will lead to increased output. The steady and consistent agitation of the Good Roads question must result in stimulating the production of granite and trap rock in this state, so that in every department the outlook for Pennsylvania is as favorable as could be asked.

Out of Rhode Island's total stone production of $461,144, no less than $444,316 was for granite. This was an increase for the latter stone of $44,188 over the previous year. The increase was chiefly in the value of stone dressed for building purposes and monumental work. The uses to which the granite was put was as follows: Sold in the rough, $70,800; dressed for building purposes, $120,428; dressed for monumental work, $232,144; made into paving blocks, $13,382; curbing, $3,461; crushed for roads, $3,483; rip-rap, $618. Rhode Island produced limestone to the value of $16,828, about two thousand dollars less than the previous year, but a large increase over the amounts of former years. Virtually all of this was made into lime. The year just ended was a prosperous one for the stone industry of the state, and the outlook for the coming year is most satisfactory. One of the oldest and most famous of the granite companies has long been involved in legal complications, but this vexatious matter was finally settled a few months ago. Rhode Island granite is famous all over this country, and is one of the few American stones that has been regularly exported to England.

The growth of the stone industry in South Carolina during the past few years has been amazing. The total value produced in 1900 was $539,217, and of this, the value of the granite output was not less than $500,802. To appreciate what these figures mean, and with what stupendous strides the granite industry in the state has advanced, it should be stated that the output of 1897 was only $37,820; of 1898, $169,518; of 1899, $361,034.

With the general prosperity in which all of the South shared, it is only natural that there should be a large increase in the amount of coarse granite crushed for roads and used for riprap. But it is a tribute to the excellent quality of the South Carolina granite that there was a proportionate increase in the amount of fine stone sold for building and monumental stock. The uses to which the stone was put were as follows: Sold in the rough, $6,376; dressed for building purposes, $143,750; dressed for monumental work, $26,498; made into paving blocks, $7,077; curbing, $2,625; crushed for roads, $99,459; rip rap, $215,017. The value of the limestone output, including a small amount for North Carolina, was $38,415. Almost the entire amount was burned into lime. There has been great activity in the granite fields of the state the past year, and several new companies have been started. The output for 1902 will undoubtedly show a decided advance. Promising deposits of marble have been prospected, especially in Union county, and there are strong probabilities that South Carolina will, before long, take a place among the marble producing states.

South Dakota is also forging ahead, with a stone production for 1900 valued at $174,552. Of this amount, $114,115 was for granite, the output having doubled since 1897. Its uses were divided as follows: Sold in the rough, $61,915; dressed for building purposes, $7,245; dressed for monumental work, $5,645; made into paving blocks, $10,344; curbing, $6,195, crushed for roads, $12,645; riprap, $21,000. The sandstone product was valued at $12,675, a slight falling off from the previous year. Of this, $5,500 was sold in the rough, and $6,800 dressed for building purposes. The limestone output was $47,762, of which $14,380 was made into lime and $33,082 was used for flux. The state has excellent stone resources, and these will be steadily developed with the growth of the population. The so-called "jasper" stone has met with great favor for its strength and durability.

The stone output for Tennessee was valued at $674,109. Of this amount the marble product was $424,054, the state still holding third place in this industry, and showing a gain of more than $60,000 over the previous year. Of the marble there was sold in the rough $88,284; for building purposes, $36,750; for cemetery work, $70,250, and for interior use, $228,770. Operations in slate are only spasmodically carried on, and the production for 1900 amounted to but $250. The limestone output was valued at $238,505, a slight increase due to the amount used for flux. Limestone sold for building purposes, $22,800; for paving and roadmaking, $26,490; made into lime, $128,035; flux, $60,564. The sandstone production was $11,300, all of the stone being used for building purposes. During the year that has just ended the marble trade of Tennessee has been in a most satisfactory condition. The old quarries have been activly worked, and promising new deposits have been opened up. No stone produced in this country is better suited for interior use, and with the increase in building operations the demand for it is steadily growing. As was recently pointed out in this magazine, what is imperatively needed in the Tennessee marble field is such a capitalization that jobs of any magnitude can be undertaken. This would

place the state on the same footing as the two greater marble centers, Vermont and Georgia.

The stone production of Texas was $237,835, of which amount the limestone output was valued at $124,728. This was an increase of one-fifth in the latter stone over the previous year, most of which was in material for paving and roadmaking. The uses of the limestone were: For building purposes, $15,681; paving and roadmaking, $9,821; made into lime, $79,659; flux, $18,942. The granite output was $76,069, as against $84,945 for the previous year. Of this amount, $19,808 was sold in the rough; $25,616 was dressed for monumental work; $3,500 was used for curbing; $6,015 was crushed for roads, and $21,000 was used for riprap. The sandstone production was $37,038, a very slight gain. There was sold in the rough, $15,066; dressed for building purposes, $12,847, and sold for curbing and flagstone, $9,125. No state has a greater wealth of undeveloped resources than Texas. These are gradually being investigated and made known by the State Geological Survey. There are beautiful marbles in the state, including a rich green that has been prospected and may soon be put upon the market. Recently deposits of soapstone and talc have attracted attention. There is an excellent sandstone in the Pecos region that was rather extensively worked some time ago. Legal complications interrupted production, but a new company has taken over the property and will doubtless do much to exploit the stone in the near future.

Utah produced stone valued at $81,652. Of this, $68,133 was sandstone, more than double the output of the previous year. There was sold in the rough, $9,029; dressed for building purposes, $52,548; sold for curbing and flagstone, $5,006. The great increase was, of course, in the amount used for building. Granite production fell off more than a half, the value being only $2,170, equally divided between stone sold in the rough and stone dressed for monumental work. The future of the sandstone industry in Utah, as well as in most of the western states, seems to be particularly promising. The stone is sound and even in texture, of good color, and can easily be worked. It seems to stand the severe climate unusually well.

Vermont takes second place among stone-producing states, with an output for 1900 reaching the enormous total of $4,704,202. As in the case of Pennsylvania, which alone surpasses it, the prëeminence of Vermont is due to the variety of its stone resources. Its production of marble was valued at almost two and a half million dollars; the granite output passed the million-dollar mark by a good margin; slate amost reached a full million, while there was a most respectable production of limestone. For some years past Vermont has quarried and sold such an immense amount of marble that there has been no room for great gains, although an increase is shown each year. The value for 1900 was $2,484,852, divided as to uses as follows: Sold in the rough, $123,310; building, $574,623; ornamental, $6,000; cemetery, $1,510,980; interior, $202,950; for other purposes, $66,989. The output of granite was $1,113,788, a slight decrease which was in the value of granite sold for building purposes, as there was

an increase in monumental stock. A very small amount of granite was used for paving curbing, roadmaking and riprap, only about $10,000 worth in all. There was sold in the rough, $526,370; dressed for building purposes, $49,763, and dressed for monumental work, $527,053. Vermont ranks second in the list of slate-producing states, both in the value of roofing slate and milled stock. The output was valued at $917,462, of which $795,474 was roofing slate. The limestone production was $188,100, all but a few hundred dollars of which represents the stone burned into lime. Never in its entire history has the marble industry of Vermont showed a greater activity than in the year just ended. The most striking feature was the formation of a new company, with ample financial backing, to take over one of the oldest and most famous quarries, as well as a great marble property that has been known for years but never worked. This new concern is building mills of the largest size and most improved equipment. The industry at Dorset, which has not been particularly active for some years past, receives a great impetus in the construction of the New York Public Library. Other important changes are in contemplation this coming spring. Both the granite and the slate industries have prospered greatly the past year, and enter upon 1902 with the promise of far exceeding any production the state has ever known.

The stone product of Virginia for 1900 was valued at $810,609. The limestone output was valued at $403,318, a great increase over recent years. This gain was largely in the stone used for flux, which was valued at $237,840. The amount burned into lime, $151,687, also showed a substantial increase. The granite output was valued at $211,080, a little less than the previous year, but much in advance of two and three years before. There was sold in the rough, $54,225; dressed for building purposes, $55,296; dressed for monumental work, $21,461; made into paving blocks, $16,605; curbing, $8,810; crushed for roads, $38,850; riprap, $15,833. Owing to business changes, but a small quantity of sandstone was quarried in Virginia in 1900. The value was $6,000, all of the stone being used for building. There was a slight gain in the slate output, the value being $190,211, all but $5,000 of which was in roofing slate. The figures for the year just ended are likely to show a decided increase in all branches. Virginia has some rare deposits of granite, in colors and mottlings that are unique. These have attracted great attention wherever the samples have been seen. No determined efforts have been made to exploit this stone, but it cannot long be kept from the market with the present strong demand for novelties.

Washington's stone production in 1900 was valued at $378,032. Limestone to the amount of $249,163 was produced, almost double as much as the previous year. Nearly all of it, or $239,022, was burned into lime. The sandstone output was $68,133, of which $38,211 was sold in the rough, and $29,172 dressed for building purposes. The granite production increased slightly over 1899, but showed an enormous gain over previous years. The total output was $48,900; sold in the rough, $15,500; dressed for building purposes, $13,500; dressed for monumental work, $10,000;

curbing, $9,500. The marble quarried and sold amounted to $11,836, most of which was used in cemetery work. Marble production in Washington has merely made a promising beginning. There is a great wealth of marble and onyx in a wide range of color and markings. Recently a tremendous boom in marble properties has begun, and there is danger that an industry which might mean much to the state will be ruined by reckless speculation.

West Virginia's total stone production was $199,316. The value of limestone was $53,701, a slight decrease. There was sold in the rough, $9,391; burned into lime, $36,677; sold to lime burners, $5,851, and used for flux, $1,742. The sandstone output was $72,438, of which there was sold in the rough, $6,615; dressed for building purposes, $58,700, and sold for grindstones, $6,823. There has just begun in West Virginia the development of extensive deposits of limestone which is particularly suited for fluxing purposes. A number of new quarries are being opened on the most extensive scale, and will probably be in full operation this spring.

Wisconsin, in 1900, took tenth place among the stone producing states, its output being valued at $1,478,967. The limestone product had a value of $989,685, an increase of no less than $163,199 over the previous year. Sold for building purposes, $177,386; paving and road-making, $231,356; riprap, $110,263; made into lime, $445,193; sold to lime-burners, $3,630; flux, $15,861. The granite output was $407,711, a gain of $137,173 over the previous year. Sold in the rough, $19,335; dressed for building purposes, $90,985; dressed for monumental work, $107,142; made into paving blocks, $101,902; curbing, $5,875; crushed for roads, $81,544; riprap, $928. The figures for sandstone production are less favorable. The value was only $81,571, a decrease of $51,330 from the previous year. Many of the larger quarries gave decreased production, and less stone was used in railroad construction. Sold in the rough, $30,237; dressed for building purposes, $47,-680. The year just ended showed a fair activity. It witnessed a combination of the crushed stone producers that promises to put this branch of the industry on a sound footing. Heretofore competition has been so keen that profit was out of the question. All that is needed in order to give Wisconsin granites a foremost place for decorative purposes and fine monumental work is increased railroad facilities. In rich coloring the stone is surpassed by no other now produced in the world.

Wyoming has done but little as yet in the stone line. The total production for 1900 was only $39,436. Of this, $27,671 was sandstone, a slight decrease. Sold in the rough, $16,354; dressed for building purposes, $8,317. The granite output was $8,700; sold in the rough, $6,900; dressed for building purposes, $1,800. Limestone production, $3,065, of which there was made into lime $2,640, and used for building purposes, $425. Wyoming has enormous deposits of fine sandstone, suitable for building or the manufacture of grindstones. The only thing that prevents the development of the industry is the difficulty of finding a market within reasonable distance. With the growth of population this stone will find its opportunity.

In the four articles which we have prepared, based upon returns made to the U. S. Geological Survey, supplemented by reports from correspondents

of this magazine, it has been shown that there was general prosperity in the stone industry during 1900. The returns for 1901 cannot be tabulated and published for months, but it is certain that they will show a decided advance in almost every line. Unless there is some set-back that cannot now be foreseen the year just beginning will be almost beyond comparison with anything that has ever preceded it.

CEMENT-MAKING IN INDIANA.

FREQUENT mention has been made of the growth of the cement industry in Indiana. Two years ago the State produced no Portland cement at all. A factory was built at Stroh, and last year this had an output of 120,000 barrels, valued at $150,000. In the early part of the year another factory was completed at Syracuse, and although this was only operated eight months, it produced 153,201 barrels, valued at $199,161. Both of these factories have recently been greatly enlarged. The Lehigh Portland Cement Company, of Allentown, Pa., some time ago purchased 200 acres of stone land two miles northeast of Mitchell, Lawrence County, and 40 acres of shale at "Blue Lick," Jackson County. They are now completing an immense plant at Mitchell that will have a capacity at the start of 2,000 barrels a day. Ten large steel rotary kilns, each 60 feet long and 6 feet in diameter, are already on the ground. Work on the construction of the plant has been delayed somewhat owing to the severity of the weather and the inability of the company to get the necessary amount of iron. Several buildings, however, are already completed. All of the buildings have foundations of concrete and the walls of all of them except the office are built of cement and iron.

State Geologist W. S. Blatchley, who has been untiring in his efforts to develop the stone resources of the state and who has repeatedly called attention to the suitability of Indiana limestone for cement making, is naturally greatly interested in the establishment of this immense plant at Mitchell. After inspecting the work being done by the Lehigh Company, Mr. Blatchley said:

"The deposit of shale in Jackson County was unknown until I discovered it in July, 1897, and published a full account of it, with chemical analysis, in my report for that year. Approximately, 23 per cent. of shale is mixed with 77 per cent. of limestone, both having been previously ground to a very fine powder, and then burned in the rotary kilns. The fuel used will be powdered coal blown into one end of the kiln by a rotary blower. After burning, it is again ground fine into the finished product. The stone used has been analyzed and found to contain 98 per cent. of carbonate of lime.

"For several years I have called attention in my reports to the suitability of the stone about Bloomington, Bedford, Mitchell and other points in southern Indiana for making Portland cement. I published the results of tests which showed the cement from such stone to equal in tensile strength that made from any material in the United States, and to be equal, if not

superior, to that imported. The Lehigh Company, before investing a dollar at Mitchell, made the kind of a test which all such enterprises should make. They shipped to their factories at Allentown two carloads of the stone, one carload of shale and one of Indiana coal. From these raw materials they made a large quantity of cement. This was found to be of most excellent quality, and fully substantiated all the claims I had made for the materials. With the raw material present in inexhaustible quantity; with excellent railway transportation and with cheap coal from the counties adjoining, the Lehigh Company is to be congratulated on their choice of a site. With these three factors present they can turn out completed product as cheaply as any company in the Union."

AMERICA'S IMPORTATION OF SCOTCH GRANITE.

THE year that has just ended has been phenomenally prosperous in the American granite trade. The improvement has been noted in all lines. Never in the history of the country has there been such activity in building, and some of the largest contracts ever awarded for single buildings have gone to the granite companies. The monumental trade has also responded to the general conditions of prosperity. Municipal improvements throughout the country, aggregating hundreds of millions of dollars, have been undertaken, and these have flooded the quarries with orders. While conditions are so satisfactory on this side of the ocean, trade in the granite centers of the old world have been nothing like as prosperous. While business has shown an improvement in most places over 1900, it did not make the gains that were expected. On the continent a distinct feeling of depression is noted. In England the granite men were in a measure prepared for the actual condition of affairs. With the country at war it was scarcely to be expected that very decided gains could be made in the granite industry. In the Aberdeen district the architectural and monumental departments have shown fairly good results. Most of the manufacturers have been pretty well supplied with orders and the volume of business exceeds that of the previous year, owing to the development of architectural work in granite. It is reported as a peculiar feature of the trade that while the demand for polished granite fronts for London and other large cities fell off, the loss was more than made good by orders received from small towns in every part of the Kingdom. The trade with the colonies is considered satisfactory, with the exception of South Africa, which was always a large customer for monumental work. When the present war is brought to a conclusion it is believed that the demand from South Africa will be larger than ever before, not only for monumental but for architectural granite as well. Conservative observers believe that the cessation of hostilities will be followed by an unprecedented development of the country and consequent building activity. The demand for granite from Continental countries has also increased, in the case of France to a marked degree. That country is showing a desire for an increased supply of polished work in granite.

Aside from the fears of an invasion of American granite, the decrease of trade with America has caused apprehension. The *Quarry*, of London, says that hitherto the export trade of America has formed one of the chief features of the monumental department at Aberdeen. It was at one time a profitable business and the principal support of a number of the Aberdeen granite merchants, but its decline in recent years has been so marked that it has been practically abandoned by a number of the more enterprising granite manufacturers, who have discovered other channels of outlet for their products. Since 1892 (which was a record year) there has been almost a steady decline in the export trade to America until it has almost reached vanishing point. The following table will be of interest as showing the rapid decline that has taken place in what was a few years ago a most important branch of the Aberdeen granite trade:—

1892	...	...	Value Exported		...	...	£128,564
1893	...	...	"	"	...	...	91,335
1894	...	...	"	"	...	...	108,570
1895	...	...	"	"	...	...	88,159
1896	...	...	"	"	...	...	55,452
1897	...	...	"	"	...	...	36,915
1898	...	...	"	"	...	...	26,710
1899	...	...	"	"	...	...	18,078
1900	...	...	"	"	...	...	18,692
1901	...	...	"	"	...	...	17,410

It is not expected that the export trade in granite monuments to America will ever regain its former proportions, and granite manufacturers do not seem anxious to cultivate this branch of the business now, for reasons best known to themselves. What has been lost, however, in the American trade has been more than neutralized by the growing demand in recent years for polished stones for architectural purposes in the large cities of the United Kingdom. Although the volume of business done in this department may have fluctuated, there has been an upward tendency for many years, and the future prospects are of an encouraging character. With a return to activity in the building trade, a great advancement in the architectural branch of the granite trade may reasonably be expected. The great interest that is being taken in perfecting the most advanced methods of artistic work in granite, and the enormous expense that has recently been incurred by the introduction of machinery for the more rapid production of the manufactured article, are significant signs that the granite manufacturers are determined to leave nothing undone that would be likely to advance the best interests of the trade. There are now many yards in Aberdeen where the superfine work executed by the pneumatic carving tool can be seen to advantage, which marks an era in the trade. As showing the growing interest that is being taken by the operatives in learning the art of producing artistic work in granite, it may be mentioned that there were sixteen applications last year for six vacant places in the Granite Statuary Instruction Class, which are filled up by a "modelling test." Through the opportunities afforded by this class some of the young men are rapidly developing into expert and skilled workmen, who will do credit to the future history of the trade.

COMPETITION IN THE STONE TRADE.

THE editor of STONE magazine has sent me a copy of the current number of the *Stone Trades Journal* of London. My attention was attracted to a marked passage which reads as follows:

"Putting aside political and other causes which greatly affect trade, it is impossible for one to shut one's eyes to the change of the times. Competition will always be a factor which is one of the first things to be looked to in any business. This is a question we have largely to discuss with ourselves. Have we got the latest labor-saving machinery? Can a profit-sharing scheme be arranged amongst the employees that will give them full scope to work as though they were working for themselves—to increase their interest not only in their employer, but also in the quality and production of their work? Are we thoroughly up-to-date in the matter of advertising? Do we endeavor by every means possible to bring our wares before the eyes of the user, and show that we can produce and do produce the very thing he wants, instead of leaving him to find out for himself, and too often going over the silver streak for those things which are possible to be obtained within a few hundred yards of our office? There are many difficulties to face without doubt, but which, if impossible to get over, the desired end may be reached with a little diplomacy by going round. In quarrying, whether it be for granite, marble, or stone, there is, to say the least, not a very bad outlook, as one can easily judge by the growing demand for these materials. But competition will still be met with, and without keeping abreast of the times one is apt to start at a discount at the outset. Mr. George Barnum has written some articles which should be of great service to stone producers in this country, as he has dealt with such subjects as 'Getting a New Stone on the Market,' 'Some Methods of Stripping,' 'The Capitalization of Stone Companies,' 'A Lesson From Experience in Granite Quarrying,' 'The Crushed Stone Industry,' 'Experts in the Quarrying Business,' 'Advertising for the Stone Producer,' etc.

"These series of articles have appeared in STONE, and as they are thoroughly practical, showing the methods that are in some places so successfully employed across the water, we purpose reproducing them, with the permission of our American contemporary, in our next and following numbers, and in which, we doubt not, much matter will be found for reflection."

I should not be human if I were not flattered by this mark of appreciation of what I have written. I take it as a recognition of the fact that I hold a brief for no particular variety of stone and that I am working to the best of my ability to advance the interests of stone producers everywhere. Some of those who write on quarrying and the cutting of stone have gained their experience in one particular kind of stone and are interested in it to the exclusion of everything else. These are the men to whom

the producer should go with a purely technical question that has no general bearing. But I am forced to believe that on the broader topics of general policy their opinion is often warped by their special training. A man who has given all his attention to Indiana limestone, even with the best intentions in the world, is not the most helpful adviser for the sandstone quarryman, and the granite man is at a loss in considering some of the most important problems in the marble business. Besides all special points as to marble or granite, sandstone or limestone, the quarryman is interested in the very vital questions relating to stone production and the sale of his product. If I venture, therefore, to offer him my opinion on these topics it must not be thought that I enter into the lists with the specialists in the different branches.

There is one point in the quotation I have given from the *Stone Trades Journal* that should serve as an excellent text for a discourse. This is the reference to competition. It behooves every stone producer to consider first of all what shall be his attitude toward his immediate competitors in business. American business methods have recently called out wide comment in other countries owing to our tremendous industrial growth, which has enabled us to take the foremost place among the world's producers. Intelligent critics in every land have dwelt upon the fact that we do not seem to fear competition and so do not guard our mills and factories and our great industrial plants with the jealous secrecy that is the rule across the ocean. In all my experience in the stone business I have known only three or four proprietors of quarries or stone mills who have refused free permission to visitors to inspect the works. In every one of these cases, the man who interposed an objection was a foreigner. It is worth while considering whether anything lies back of this free-handed and open-minded spirit.

I think I can best convey the lesson I have in mind by recounting a conversation I recently held with a stone producer. For various reasons I cannot give full particulars as to his business and its location. It is enough to say that he was a foreigner by birth, that he has an immense and lucrative business, and that no stone of the exact kind that he produces is now sold in this immediate market. Naturally he desired to get a foothold here in New York. My conversation with him was held in the presence of a machinery maker who was endeavoring to interest him in a new stone-working appliance. The machinery man fell to talking of the conservatism of stone men and their unwillingness to give a trial to new machinery. He mentioned incidentally that one of his practices was to install a machine in some stone-working center without any initial expense to the stone man, provided that the other producers in the neighborhood should be allowed to inspect its workings.

"Well, I can tell you one thing," said the quarryman; "if I install one of your machines, none of my rivals will be allowed to see it. I do not propose to spend my good money in experimenting for the benefit of those who have entered into competition with me."

"There is where I think you make a very great mistake," I replied.

"That is not the American method. It is opposed to our entire industrial spirit, and it is worth considering if there is not some good reason why we have never carried out a narrow spirit of rivalry in this way. Let us first take up your special case, and to do this I must ask you some very searching questions. Is your stone a good one? Is it perfectly suited for the New York market, providing you can make prices and deliveries right? Are you content to let your stone speak for itself when once it has been introduced into this market? In other words, if your stone should be used in some immense and striking building, would it advertise your quarries and be apt to lead to a further demand for this particular stone? Do you consider yourself as enterprising and as liberal as your immediate competitors?"

The quarryman was taken aback by this rapid fire of questions, but he said with justifiable warmth that his stone was the best in the world, that if it once got a foot-hold in this market it would push all similar stones hard, and that in the matter of price and deliveries he was sure he could meet any competition. As to his enterprise, he thought the fact that he was on the field ready to make a fight for the desired market, while his rivals stayed at home and carried on a letter-writing campaign, was proof positive that he was just a little ahead of them in this matter.

"Then, in the name of all the prophets, why are you so afraid of competition?" I asked him. "This is a pretty big market and if you had it all to yourself it would swamp you completely. To swing the business would require millions of capital. Do you not think, too, it is a pretty big task for one man to capture the entire market for himself? Your stone is not represented here at present. If you seek to introduce it, you will meet not only with criticism and bitter opposition, but with absolute indifference as well, and this is the very hardest thing to overcome. Once your stone is firmly established here, the obtaining of orders will be merely a matter of hustling. If you hustle more than your competitors you will get the lion's share of contracts. In the long run the amount of your business in this market will be greater than if you seek to bar your rivals out completely and to fight single-handed for your stone."

"But," said the quarryman in a puzzled way, "granting that you are right in these particulars, how will I be served by allowing my competitors to see what labor-saving devices I adopt and so let them cheapen their methods of production? They will keep copying after me and so may be able to get down to my figures."

"I do not think that this fear need cause you much loss of sleep. The copyist is a hopeless distance in the rear of the originator. If you install this machine it will be months before your competitors can take it up. By this time you will be ready to try something else, and if you keep your wits about you there need be no difficulty in staying at the head in your locality. You may ask what you would gain by having your rivals cheapen their methods of production. In the first place, I have tried to show you that the best chance for getting your stone in this market is to have all of the men who quarry it work heart and soul to have it adopted by the architects and builders. If by the use of improved machinery you can get it into this market very

much cheaper than they, then you will have the single-handed fight which I have been deprecating. In the second place, when we give out our contracts we like competition. Let us suppose that your variety of stone is specified for a big job. You can rest assured that your rivals will be asked to figure as well as yourself. When the bids are opened, if there is a very great difference in the totals, it will cause comment. Not only the other quarrymen, but also the stone dealers who put in bids based on their figures, will naturally declare that your stone is cheaper because it is inferior. The architect has no time to unravel all of these disputes, and he is likely to turn at once to another stone with which he is more familiar. But, you will say, I can keep my figures up to about the bids of my competitors, and put in my pocket the difference that comes from improved methods of production. The answer to this is simple. In any way you look at it, you are seeking to shut out competition in your line, and without competition your stone will never get a strong foothold here. Look at the history of the stone-trade in this country. The stones that have made their way into highest favor are those where competition is keenest. Suppose, for instance, that there was just one quarry producing Indiana limestone. If it had millions of capital and facilities for turning out unlimited quantities of stone, do you suppose the stone would ever have come into such general use as at present? Now there are scores of strong companies, each one working in every possible way to advance the use of Indiana limestone. Every building that is put up in which the Bedford stone is used is an advertisement, not alone for the quarry from which these special blocks were obtained, but for this variety of stone itself. Nowhere has there been a hotter competition. The small and unprogressive producers may have been forced to the wall, but the big and enterprising companies have had all the business they could attend to. Exactly the same case is true of the Georgia marble producers. I mention these two stones because, being centralized in certain definite localities, they naturally lend themselves to illustration. Instances from the granite and sandstone districts could also be given."

The quarryman was not quite convinced. "We have tried a number of times to form an association in our district in order to keep the prices up and to regulate the business. It has always failed. My leading competitor will not 'play fair.' He has broken all agreements and we have forced him to pay many fines."

"There is another mistake you have made," I retorted. "Why do you want any agreement? If you tie yourself up in any way like this, your rivals get much of the benefit of your enterprise and hard work. Have a good understanding with them, and even enter into an association, so long as it does not propose to regulate prices or parcel out the market. I believe in associations, but only as long as they occupy themselves with their proper province. Let the association settle terms of sale, questions of credit and the like, but leave prices alone. What will build up your business is not pushing prices up, but cutting the cost of production down. This is a matter for you to settle for yourself alone. Cut off needless wastes, institute rigid economies, install the best and most improved machinery, send out-of-date

equipment to the scrap-heap, and then welcome any honest competition. If you are worth your salt you can more than hold your end up. If you are afraid of what your rivals may do, hire a man with more push and activity than yourself to manage your business. Such men can be had, and they are cheap in the long run, no matter what salary they ask."

The quarryman mopped his brow, and asked in a very quiet tone, "Well, then, what would you advise me to do?"

"Go back to your quarries and install this machinery that you are looking at. Do not build a shed around it, and put guards at the doors to keep out visitors. Rather invite your local newspaper to write it up, so that you may get an incidental advertisement from it. If your competitors express any curiosity concerning it, ask them to call, and take half a day off to show it to them. Tell them frankly how it works, and if it saves you money say so. Let it be known that you intend to get your stone into the New York market, if possible, because you are sure there is a good field there. Take every occasion to show that you are the most widely awake and enterprising quarryman in your territory. Advertise your stone, so that architects and stone men will not have to be told what it is, and what its merits are when they hear it mentioned. Above all, do not try to work in the dark like a mole, even if you are getting stone out of the earth. Come out into the sunlight, as if you feared no man. Show that you have perfect confidence in yourself and in your stone, and that competition has no terrors for you, as you mean always to keep just a little in advance of the procession. Then hustle—everlastingly hustle." GEORGE BARNUM.

AN ENGLISH SCULPTOR'S IMPRESSION OF TRINITY CHURCH, NEW YORK.

MR. HARRY HEMS, the well-known English sculptor and writer upon technical and artistic subjects, in a diary entitled: "10,000 Miles in 30 Days, or a Month's Holiday in 1897," records, pleasantly, how he left his home at Exeter in England, upon the 29th of July, in that year, taking the somewhat premature precaution, before leaving, to order his breakfast for 9 o'clock upon the 29th then proximo. He crossed the Atlantic, ran pretty considerably about the States, getting as far west as Kansas City, finding time to visit several old friends in Canada and to write a diary of about 300 closely written pages. Afterwards, he seems to have got back safely to Fair Park, his beautiful residence in the suburbs of the ancient and "Ever Faithful" City of Exeter, to the very tick of time pre-appointed, there not only to find a warm welcome from his family—but the breakfast, ordered a month before—awaiting him, all smoking and piping hot.

This is what he says in the diary in question of Trinity Church, New York City:

"Tuesday, Aug. 9.—A marked feature in busy Broadway, away down towards Castle Garden, and upon the left hand side coming therefrom, is

Trinity Church striking amidst a group of tall buildings by its fairly tall spire without, and by its dissenting chapel-like arrangements within. In one corner of its shady grave yard is a tall Gothic monument, erected to the memory of some of the brave fighters who fell in the War of Independence. The grass that grows luxuriantly beneath the grateful shade of the handsome and luxuriant trees is green and beautiful; and dotted very closely at every hand are headstones recording the fact that remains of once sturdy settlers have long rested peacefully beneath the clod. It is more than pleasant to linger here, and to quietly wander from grave to grave, in this tranquil and unruffled retreat; separated as it is by the simplest line of demarcation from the very threshold of what is, perhaps, the busiest hive of human life in all the world—a row of open iron rails is all that divides it from Broadway, the most bustling thoroughfare in Christendom. Most of the old headstones are of red sandstone (erected face bedded) and by no means the best kind of material for the job. Many of them have scaled off badly, through atmospheric influences, and hence the inscriptions, all too often must be described to-day, as *non est*.

The following is copied from one about two feet wide, and standing some three feet out of the ground. The idiom is quaint:

Sidney Breese,
June 9, 1767.
Ha. Sidney Breese
Layest thou here—
I here lye
'Till time is flown,
To its Extremity."

On another memorial is read:

"JOSEPH HITCHCOCK, SEN'R,

who departed this life Oct. 13:1800, aged 29 years and 6 months."

The query suggests itself to my unsophisticated mind, upon reading this record of age: How old would Mr. Joseph Hitchcock, Junior, be about that time?

Two children named EGAN, aged, respectively, 2 weeks and 2 years, died within a fortnight of one another in 1751. Their modest little stone bears the following oddly rendered epitaph:

"Ly stil, dear Babs, and take your rest,
God cald you Hom, becas he though it Best."

"Very regretfully I left this fascinating old graveyard. Still, I did not do so without, as it were, bidding a tender farewell to those who lay there, all so unconsciously, beneath the velvet turf. Then, and not 'till then, I got me into Broadway. 'Twas but a step—and yet by that single stride, I had passed from the side of those sleeping for so long, and so tranquilly, into the very midst of that never ceaseless and stern battle of life, wherein even elbow room—if it is to be attained—has to be striven and fought for."

THE MICA INDUSTRY OF THE UNITED STATES.*

PERHAPS the three most notable features connected with the mica industry in the United States during the year 1900 were the increasingly large use of American mica in electrical machinery, notwithstanding the continued large importation of foreign mica, the somewhat abnormal development of the ground mica industry, and the plans for the establishment in the United States of a plant for the use of scrap mica in the manufacture of a new boiler-tube covering.

In New Hampshire, in the Gilsum district, the Davis-Mitchell mine, on the old Kidder farm, one to two miles northwest of Gilsum, has been worked to a considerable extent and has yielded a large quantity of both sheet and scrap mica. In connection with the former working of this mine, a shaft has been sunk to a depth of 100 feet, and open-cut work has been carried for a distance of several hundred feet and to a depth of 20 to 30 feet. The work during the last year has been mainly in this open cut. Just to the northeast of this Davis-Mitchell mine, and on the same dike, another opening (the Hoskins mine) was made during the year, and a considerable quantity of both sheet and scrap mica taken out. The sheet mica from this mine was shipped to New York and Boston, while the scrap mica was ground in large part at the Hoskins mica mill at Gilsum. In the Grafton district the Grafton Mica Company worked both the Hoyt Hill mine, two to four miles east of Canaan, and the Waverly mine, just west of Grafton station, to some extent, taking from the two approximately 250 tons of mica. The work at both these mines has been mainly in the open cut. The former is located on the northwest slope of Hoyt Hill, where two or three adjacent openings have been made. The mica-bearing portion of the pegmatite dike has a thickness of from 2 to 4 feet in a fine gray biotite-granite. The latter of these two mines is located on the southwest side of Prescott Hill. The dike has a thickness of from 10 to 18 feet, the strike being northeast-southwest and the dip toward the southeast. When visited it had been mined for a length of some 200 feet and to a depth of 30 to 40 feet. The Springfield or Old Sullivan mica mine, two and a half miles southwest of Grafton station and on the northeast slope of Springfield Mountain, has been worked at intervals during the year on a small scale, but mainly for the beryls and other rarer minerals that are to be found there. The old Ruggles mine, on Isinglass Hill, in this same district, which is perhaps the most famous mica mine in this country, and where the first mica mining in the United States by white men is said to have been carried on has been idle for several years, owing to legal complications; but the great dumps of scrap mica to be found about the openings indicate the large quantity of fine mica which has been taken from this property in the past, and a partial examination of the workings indicates that the dike still carries a considerable quantity of mica available for future mining operations.

In the North Groton district of New Hampshire the Fletcher mine, on Fletcher Hill, two and a half miles northeast of North Groton, was worked

*From "Mineral Resources of the United States," U. S. Geological Survey.

during the year on a small scale. Some years ago it was worked on a much larger scale. The dike here is 20 to 40 feet wide, with a northeast course, and has been worked mainly as an open cut for a distance of some 150 feet. A new mine was opened up during the year and worked to a considerable extent by Messrs. Lay and Grange, three to four miles northwest of North Groton. When visited the open cut on this mine had extended to a depth of 30 feet and a length of about 150 feet, and it was said that some 200,000 pounds of crude mica had been taken out during the preceding six months. This mine was equipped with modern steam drills and had associated with it at North Groton a well-equipped plant employing a dozen or fifteen men, where the mica was cut and prepared for market. In this district also are the famous Palermo and Valencia mines, but no work has been done at either of these for several years, except to remove in part from the old dumps the scrap mica, of which considerable quantities still remain. The Rice mine, about one and a half miles southwest from North Groton, has been worked at intervals during the last several years and a large amount of good mica is said to have been taken from it, but only a little work was done there during the year 1900.

In Alexandria Township the Newfound mica mine, three miles northwest of Alexandria post office, was worked during a considerable portion of the year by the Newfound Mica Company, with an outfit of two steam drills and a cutting house. The dike here has a thickness of 8 to 15 feet and contains a fair proportion of good mica. The Patten mine, three miles west of Alexandria post office, has in the past yielded a large quantity of good mica, and will doubtless again in the future be a good producing mine, but it has not been worked during the last few years. The statement may be said to apply to a number of well-known New Hampshire mica mines.

In North Carolina mica mining has made some progress during the year, although it has been handicapped by low prices for the product, due to the large importations of foreign mica. The principal work has been done in the mountain counties, mainly Mitchell, Yancey, Haywood, Jackson, and Moscow, where a number of the older mines were reopened and a few new mines were developed. East of the Blue Ridge Mountains, in McDowell County, a mine (the Cochran) has been developed about eight miles north of Marion, and some good plate mica has been obtained. Another mine has been opened up and worked on a small scale during the year in Stokes County, near Sandy Ridge, and a limited amount of similar development work was carried on in Cleveland and Rutherford counties.

West of the Blue Ridge, in Ashe County, the Carolina Mica Company has developed a mine on Beaver Creek, near Jefferson, employing twenty men during the last three months of the year. This company has also erected near by a mill for grinding the scrap mica. In Mitchell and Yancey counties nearly all of the older and well-known mines, such as the Deake, Spread Eagle, Cloudland, Double Head, Hawkins, Clarissa, and others, have been worked at intervals during the year, though some of them on a small scale. Nearly all of this work was done by parties whose available capital was so small that they were unable to purchase modern pumps and

other equipment needed in working these deeper mines—one shaft in the Clarissa, for example, having been sunk to a depth of more than 300 feet.

In Haywood County the Big Ridge mica mine, seven miles from Waynesville, was worked on a considerable scale throughout the entire year, and was probably the largest producer of the region. The Shiny mine, eight miles from Waynesville, was worked for about five months of the year, and yielded considerable quantities of both sheet and scrap mica. In Jackson County a number of mines have been actively worked during longer or shorter periods. The Toxaway Company has developed several mica deposits on its lands near Sapphire, taking out a considerable quantity of crude sheet mica. Several additional deposits have been developed with similar result on the adjoining Grimshawe lands. In other portions of the county the Frady and East Fork mines were operated successfully during half of the year, and the Long and Ferguson and other deposits were worked during shorter periods. In Macon County mining has been less active than during the recent past, the work at the Lyle, Knob, and Raby mines extending over not exceeding half of the year, and that at other deposits being rather developmental and irregular.

In the Black Hills district of South Dakota there has also been renewed activity in mica mining during the latter part of the year. The well-known New York mine was opened up in October and has been worked by a force of from ten to thirty men since that time. Several carloads of crude mica have been produced and shipped to the eastern markets. Indications at this mine are favorable for a future output of considerable magnitude. The Monarch (Old Wormly), two and a half miles west of Custer, has been worked during the year as an open cut to a depth of 20 or more feet, and in the bottom of this open cut a shaft was sunk to a considerable depth. The pegmatite dike at this point is a large one, having a thickness of more than 100 feet and being a prominent topographic feature in that region. It has a general course northwest-southeast, and rises above the surface at intervals for more than a mile. Other similar dikes lying just to the east of these are known to carry tin ore, but no tin has as yet been found in the dike on which the Monarch mine is located. The McMackin mica mine, three miles northwest from Custer, perhaps the most famous and the largest producer among the mica mines of the Black Hills region, had not been worked for several years, but was prospected and opened up anew toward the end of 1900. It will probably again become one of the large producers of that region. The Etna mine, one mile south of Custer, was operated during the summer of 1900, the work being mainly by the open cut, but a shaft was being sunk when the mine was visited in October. The mica-bearing dike is here a large one, being exposed for 1,500 to 2,000 feet and having a thickness, including the interbedded masses of schist, of 30 to 100 feet. A limited amount of prospecting work was done at several of the well-known mines in the vicinity of Custer, and the outlook for larger mining operations during the year 1901 is good.

In the Keystone district, on the east side of the Black Hills, several well-known mica dikes, including the Etta tin dike, have during the last few

years been worked for spodumene; and during the year 1900 considerable quantities of this mineral were mined and shipped to eastern markets.

In New Mexico the mining for mica during 1900 was limited to two districts. In the Petaca district some development work was done at the well-known Cribbens mine, but the more extensive mining operations were carried on by the American Mica Mining and Milling Company at the Petaca mine, one mile west of Petaca village; at the Texas mine, one and a quarter miles southwest from the Petaca, and at the Gulch mine, the Talco Grandy, Keystone, Vivian, and Kit Carson mines, all lying to the north of the Petaca. A considerable amount of work was done at these places, but the product was largely scrap mica and was shipped East for grinding purposes. Only a small per cent. (from 1 to 3) of the mica at these different mines was saved as sheet mica. At the Highlands mica mine, three to four miles northwest of Petaca, a limited amount of mining was done during the year by the Standard Mica Company, the entire output of the mine being shipped East in the crude form. The Kansas City (No. 3) mica mine, located about one mile northwest of the Highlands and on the west side, about 100 feet above the bottom of the canyon which passes between the two, has been worked to some extent during both 1899 and 1900, the work being mainly in an open cut about 30 feet deep and 30 to 40 feet long. One of the features of this mica region during the year has been the working of several mines, notably the Keystone, for scrap mica alone, which was hauled ten to fifteen miles by wagon and shipped to Cleveland, Ohio, in the crude form for grinding purposes.

In the region about Harvey's ranch, some twenty-five miles northwest of Las Vegas, New Mexico, a limited amount of mica mining has been carried on during the year, but this has been largely of a prospecting nature. Several of the openings, however, have yielded a quantity of mica of good quality. Among these may be mentioned the Smuggler mine, one-third of a mile northwest of Garnet Peak, where an old tunnel was some years ago run into the hill for a distance of 245 feet. At the Kirhowreger mine, about 400 feet southeast from the Smuggler, a tunnel has been run into the pegmatite dike for a distance of 40 feet. Little mica, however, was exposed. The Hillside mica mine, about three-quarters of a mile southwest from the Smuggler, has been worked to a limited extent as an open cut in the face of a large pegmatite dike, which can be traced for a distance of several hundred yards. The Rising Sun mica mine, 300 to 400 yards northwest from Harvey's ranch, was opened up as a prospect hole in 1883 by Messrs. Beatty and Gray. This opening was still further enlarged in 1899 and a limited amount of mica taken from the mine. No work has been done there since that date. The Gray Eagle mica mine, one-half mile southwest from Harvey's, was opened up to a depth of 10 to 12 feet in 1882; it was enlarged in 1896 and again in 1899, a limited amount of mica being taken out each time, but no work has been done since the latter date.

On the west slope of Baldy Mountain, some 25 miles north of Santa Fe, a limited amount of prospecting for mica has been carried on during the last year, but no extensive mining operations have as yet been attempted

in that region. The pegmatite dikes found there are both large and numerous and at a number of places small crystals of mica appear in the surface of these masses, but the development work has not been carried on to a sufficient extent to open up any large deposits of commercial mica.

J. A. HOLMES.

CONCRETE IN ENGLAND.*

DURING the last twenty years some of the advantages of a freer and more extensive use of concrete have become patent to the profession. In my opinion, however, its adaptability for various classes of work entitles it to much more extensive employment. I do not advise its use in elevation above the ground, but freely in works below, where the matrix seems to find its natural place. For foundations in damp situations concrete has no equal, but it looks cold and uninteresting in elevation, even in promenade sea-walls. I would use it freely in cellar foundations, for floor and side walls, and I would also employ it freely for arch-sheeting, not in preference to ashlar quoins but in preference to bricks. It lends itself to this class of work admirably, and is much cheaper when suitable concrete-stone is at hand for making it. Three of the arches on the Langsett tram-line are turned with it, also the intermediate arches at Mortimer Road resting on steel girders; and although a 30-ton locomotive has daily passed over this 30 foot span bridge for nearly four years not a hitch has appeared, although critics anticipated a failure. There is probably no structural bond so good as well-set brickwork, and no mass so solid and impervious as concrete. It is extensively used for large engine-beds, and is replacing ashlar masonry for this class of work; it is less dense, however, but this may be an advantage, as the continued vibration may find a more easy cushion on which to react and thus prolong the lives of prime movers. I know no better material for light-arching and footbridges, and it has advantages for collieries; if made from hard shale and cinder ashes, it is most suitable and economical for use in the construction of temporary erections.

Cement will bind and amalgamate with all kinds of durable materials, regardless of color or shape, if they be broken small enough and provided with sufficient fine admixture to form a gelatinous mass. Burnt-shale concrete is an excellent ingredient for many kinds of work which architects and engineers are called upon to execute. It only requires bringing to the front and giving a fair trial to commend itself to the profession generally. I do not, however, recommend it for work having to resist great compressive strains, but in breast or burr walls, for backing, and similar less important jobs where the facing is of stone or bricks. Backing of this kind is infinitely better than coarse rubble or damaged bricks carelessly built regardless of bond or bed.

I come now to consider the more important use of concrete in large engineering undertakings, and mainly in concrete trenches and embankments for

*Extract from a paper read before the Society of Architects and Surveyors, at Sheffield, Eng.

reservoirs. English hydraulic engineers have been slow in adopting concrete as a foundation material for deep trenches. Why this is so I do not know; either extreme caution has been the motive, or want of experience in its use. In every new departure from old and tried customs cautious men proceed slowly. Caution is a virtue if not carried too far, when it becomes weakness. Men of genius try new methods, and deserve our thanks and sympathy even if they fail. Concrete trenches for reservoir embankments are better and much cheaper than puddle trenches. . . . . .

Concrete and masonry barriers represent the latest fashion of reservoir-making in England, and the gloss of novelty still remains. They were practically unknown half a century ago, save to a few hydraulic engineers, but are venerable structures in the East. Where rock dominates, especially the older deposits; clay and earthwork are scarce; drainage areas large; and where it is found necessary to make the whole length of the dam into a waste weir; such sites are favorable for the use of concrete structures. In very dry climates earthwork embankments built on a large scale are a source of danger, owing to the evaporating power of the hot sun and dry winds causing deep cracks to form in the outer slopes, which get filled with rain when it comes and induce slips. In humid climates like our own there is no danger of this kind; heavy dews forming on the grassy slopes protect them, and in the driest months of the most droughty year we have some rain. Earthen embankments are more ancient than concrete ones, and those built by the ancient Egyptians still endure.

Wise engineering consists in utilizing the available material found in the district in which the proposed work is to be erected, whether that material be solid rock or earthwork. An earthen dam is cheaper than one made of concrete. It is sooner brought into use; and, as the president of the Institution of Civil Engineers said in his inaugural address last November, comparing the numbers of the two forms of dam in use, fewer failures have taken place in the former than in the latter type of embankment. Before an embankment of any kind can be made much detailed work has to be done, and it is the attention paid to details that makes every work a success, more particularly, I believe, in waterworks. You may have good designs and employ the best material, but if carelessly put together the genius of the man is diverted and good material shamefully wasted.

Stone broken by machinery is much better than hand-broken stone, and costs considerably less. It is more uniform in size; and when the breaker is carefully attended to, it provides the necessary amount of sand requisite to form the concrete matrix. The best stone for hydraulic concrete is the millstone grit, or rock of a similar texture—the coarser the grit the better, but it should be free from dirt. If clayey matter adheres to the stone it should be scraped off, and if necessary the beds should be washed. Old fence walls and rejected bricks make good concrete. It is not necessary to provide very hard material to secure impervious concrete in a reservoir trench; but the hardest stone should be provided for sewers, tunnels and sea-walls, where there is surface friction to be resisted. The hardest class of stone should also be used in arching, forming footpaths, barn, shippon and stable floors.

Flint gravel makes the hardest and perhaps the most durable concrete, but it is expensive and difficult to obtain in the north of England. Some engineers screen the stone as it falls from the breaker and wash the sand before using it, but this seems costly and unnecessary when the rock in bulk can be obtained clean. The dust produced in breaking forms a very small percentage of the matrix, and in my opinion improves it when required for impervious work. The finer interspaces get filled, and in this respect the dust seems to act beneficially.

For water-tight concrete the stone should be broken in cubes no larger than will pass through a 2 inch ring, and should contain plenty of sand. For foundations in which the impervious character of the matrix is no object, larger stones may be used, but it is a question whether the smaller are not better, and it is wiser to err on the safe side. Where compressive strains only are to be encountered, clean dry stone may be employed in 3 inch layers, pounded and grouted with a cement liquid. For bridge-pits, lofty chimneys and buildings better foundations cannot be formed. It must be understood, however, that I am speaking of foundations below the ground, where compressive strains only are brought into play. Where large masses of concrete are required, blocks of stone called "plums" are frequently embedded in it to reduce the cost; these "plums" should be well cleaned and laid the best bed down in the matrix whilst it is in a soft state, and care should be taken that they are placed well apart so as to ensure that the soft material covers and overlaps them. "Plums" increase the density and stiffen the mass, and there is no objection to their use when the work is properly done. When the stone is broken by a stone-breaker it should fall into a wagon or skip and be taken to the mixing stage and manipulated at once.

The mixture then has its proper quantity of sand, which cannot be secured when run to spoil and subsequently refilled, owing to the stone separating from the sand, which is unavoidable in a large heap. In executing work of any kind the fewer and simpler the operations the better; thus labor also is saved, an important consideration in large public works.

It is necessary that all concrete should be carefully and properly mixed. Next to the use of good material, this is most important. The mixture should be thin, placed in position in this state, and never disurbed afterwards. Setting begins at once, and the crystallizing forces want free play, which they cannot have if the work be disturbed by men passing over it. The broken stone and cement should be measured in boxes provided for the purpose, and as much clean water used as the matrix requires to form the proper consistency—more rather than less. The mixings should not be too large: 20 cub. ft. of stone and sand and 4 cub. ft. of cement form a good mixing sufficiently large for a gang of six men to prepare and place in position before setting begins. The slow-setting cement gives more time and insures a better conglomerate, especially if the mixing stage be some distance from the place where the matrix is required. In watering the mixture a jet or rose should be used, as it moistens the material more evenly than when water is poured on it from a bucket. During the last turning the mixture is much improved by kneading with a light pick or shovel, the

object being to thoroughly amalgamate the whole. The most trustworthy men should be employed for this class of work; they soon get accustomed to it and learn from experience to use their reasoning powers as well as their hands, and if properly paid they may generally be depended upon to do their duty. For more than twenty years I have been in the habit of letting the mixing of concrete to specially-selected gangs of men, and have never had cause to regret. The men also seem to prefer taking the work in this way. Inspectors are usually employed on large works to see that directions are carefully followed; but as a rule a good English navy will be loyal to employers who are worth serving.

WILLIAM WATTS, M. INST. M. E., F. G. S.

A PIECE OF STONE.

NO man can make a business of quarrying stone without picking up many elementary facts in geology. But some men are far more observing and curious than others. One man may be very successful as a quarry manager, and yet never give a thought to geological science beyond merely the nature of the special deposit in which he works. Another man may generalize from the concrete facts that come under his immediate observation, and to increase his store of knowledge may study the nature of all stone formations that he sees. Although the rule does not always hold good, the latter is apt to prove a far more useful man in the quarry than the former. He is not so likely to be puzzled by new conditions that are constantly arriving, nor need he always confine himself to one narrow line of work. These facts are emphasized and given a new point by an article that appears in "The Illustrated Carpenter and Builder," under the above heading. Although this was written with special consideration for English readers, it should prove of equal interest for the American worker in stone. The writer says:

The builder who is so well acquainted with the nature of the stone he employs that he is able to decide as to its powers of endurance to fight the many enemies it has to meet is certainly more likely to be successful than the unobservant man to whom granite, marble, or sandstone are simply certain materials bearing these names and nothing more. Knowledge of this character can only be gained by knowing something of the birth-home of stone, by tracing its development, and by testing it chemically. Such an observer, having dived somewhat into geological facts, cannot pass a simple gravel pit without arousing a large field of thought, while a visit to the granite quarries of Aberdeen or to the slate quarries of Bangor opens an insight into the workings of Nature calculated to inspire the intellect and to save from serious mistakes.

But a moment's consideration is necessary to call to mind how largely stone enters into the composition of even the humblest dwelling. The house is roofed in with slates, the walls are constructed of brick (which is indeed a stone, for it is constructed from a kind of soft stone we call clay, out of which the water has been dried), the domestic hearth may be of flag-

stone, the window ledges of sandstone, the chimneypieces of marble, while burning in the grate we find an important stone we call coal. In some parts of the United Kingdom, such as at Aberdeen, almost the whole of a house visible to the passer-by is constructed of stone; and even the usual charming green hedges we love to see in England are in neighborhood of quarries constructed of stone. In our streets we usually walk on stone; our churches, theatres, and public buildings are constructed almost entirely of stone; our forefathers built their rude temples entirely of stone; the Druidical remains on Salisbury Plain and on many other spots show us how stone was utilized in the past; our ancestors fought with weapons of stone; those we delight to honor we send down to posterity in images carved in stone.

Nature, ever consistent in her working, unfolds to us the history of the past by the contemplation of what is taking place at the present. The surest way, therefore, of revealing to ourselves the mysteries of the world's physical history is to observe the workings of Nature all around us.

The forces of Nature act slowly, and vast periods have to pass before any great changes are visible; but we are able by observation and deduction to draw conclusions which give us a reasonable explanation of what, at first sight, appears to be a great mystery.

We may roughly class all stone under three heads—the sedimentary, the organic, and the igneous. These words are in themselves an explanation. Sediment, the floating matter in running water; the organic, the remains of the bodies of animals; the igneous (Latin, igneous—fire), that which comes forth from the interior of the earth.

The quaking bog shows us coal in the process of formation; the coral island how land is being continually built up; the entrance of a turgid stream into a lake and its exit as a purified river shows us that a vast amount of sediment has gone somewhere, for in the great economy of Nature nothing is lost. The materials of which the world is built up continually change their shape, but they are never annihilated; thus the world now would weigh exactly the same as it did when it came into being but for the meteoric stones and dust which have fallen upon it from the heavens.

The solid rock may be worn to powder; the everlasting hills, as they are named, under volcanic pressure may run like water or be belched forth into the air in the form of gases; they may, and in many instances do, return to their original state, and become rocks and hills once again.

Most of the rocks of England are of a sedimentary character, they have been produced by the action of running water and have been deposited under water. That this is so we are certain when we come to examine the nature of the fossils the sedimentary rocks contain, and also by watching the process of deposition going on at the present day. We have only to watch the action of a stream hurrying down a hillside and to see what it does with the burden it bears to discover a very good example of the formation of the sedimentary rocks.

It is plain from every day observation that water running over any kind of soil, whether it be hard granite, soft shale, or friable limestone, the action of the water will certainly be to wear away certain portions of the soil.

The water will also carry away in its current certain portions of its bed and banks, for these have become loosened or fractured by the action of frost and by the disintegrating power of either the acids in the air or of acids in plants, which not only break up soft soil but also eat away the hardest rock on which it might be reasonably conjectured it would be impossible for any living organism to thrive.

Fine grains of sand, boulders of gravel, and any living thing coming in the way, one and all are carried along to the mouth where the stream joins some larger mass of water, and here the stream rids itself of its burden, the heavier material being deposited first, the lighter being carried farther out.

Now, if at the mouth of any such stream we make a cutting, such a section will show us a vast number of grains of sand pressed together by the accumulated weight of an ever-increasing burden on the top; at the same time we discover that the lime carried away with the sand has acted as a cement to assist the grains of sand to become one compact mass.

Such a process is going on wherever a stream is cutting for itself a channel, and where in the course of its journey its progress is delayed and it has, consequently, an opportunity of depositing its load. Pure water is itself a destructive agent, dissolving every element but gold and platinum, but when, from the air or the soil over which it passes, it becomes charged with carbon dioxide, iron dioxide, etc., its solvent powers become largely increased.

The amount of solid matter brought down by great rivers to the ocean is beyond our comprehension. Thus the Ganges is said to transport 557 cubic feet of solid matter each second. Such an amount of matter, it is computed, would be sufficient in a year to build erections equal to forty-two great pyramids in extent. The Rhone has left so much of its load in the still waters of Lake Geneva that Port Valais, which in the time of the Romans stood on its banks, is now two miles inland.

The matter thus deposited is largely increased by the skeletons of the millions of creatures who make their shells out of the lime carried in solution in the water. These find their grave in the soft deposit, and the whole becomes in time hardened into a compact mass of stone. By volcanic action this stone is forced upwards, for all evidence goes to show that it is not the water that has receded but the bottom of the sea that has made its way to the surface.

In some parts of the world sandstone can be actually seen in the course of formation. Thus, on the west coast of Ascension Island, on the beach, may be found numerous fragments of shells, corals, etc.; these may be handled, for they are loose, like the shells on our own Sheppey Island off Sheerness. We have, however, but to dig down a few feet when the shells are found pressed and cemented into a solid stone, indeed some of this stone is said to have the ring of flint, and in consequence it is unsuitable for building purposes.

The skeletons of sponges, corals, starfish, and the minute foraminifera have a very large share in the formation of limestone rock. Under the microscope, such a stone shows the skeletons of seaweed, corals, and even microscopic shells in perfect condition.

We know that at the present day coral does not grow north of the Bermudas, but in the ages past, when climates were not as they are now, the coral was busily employed making our Devonshire and Bristol marbles.

In a very large way no doubt the original parent of the sedimentary rock is the igneous rock granite, for if we examine a piece of sedimentary rock we see the shining particles of mica, the glassy quartz, and the pale felspar, all of which, however hard they may be, give way to the action of water and become reduced to powder.

The origin of granite is at present a mystery; that heat has had an active part in producing its composition we see clearly from the crystals, of which it is composed. Whether it formed part of the original substance of the globe is uncertain; the changes it has undergone cannot be easily explained.

The enormous masses of lava which have poured forth at times from active volcanoes have deposited both on land and under the sea vast quantities of stone, and, where these are not rendered unfit for building purposes by numerous steam holes, they have been found of great use.

Sedimentary rocks have become metamorphozed by heat into marble; the fossils the rocks contained have been thus destroyed; while various minerals have imparted its charming tints and crystallization has enabled it to take its rare polish.

A piece of stone, whether it be the granite the steam roller forces into our roads, the humble pebble on the sea shore, or the black diamonds we burn in the grate, all have a history and an interest which only those can appreciate who turn aside for a time from the common duties of life and give their thoughts to the works of nature around them.

FLORENTINE QUARRIES.

ACCORDING to the British Consul-General, in the province of Florence there are 202 stone quarries in actual work, four of which are serpentine *verde di Prato*, five calcareous stone (*alberese*), two grindstone (*enfotide* or *granitone*), five fireproof stone, three calcareous stuff, 170 "arenaria" (hard greystone for olive presses), eleven building stone (*pietra forte*) and two majolica earth.

The serpentine (*verde di Prato*) serves for architectural and ornamental purposes. These quarries, situated at Monferrato, near Prato, have been worked from a very early date. In 1365 they were taken on lease by the Opera del Duomo to employ the stone in ornamental works on the cathedral. At present they are in the hands of two private persons, and their output (valued at £1,000 per annum) is almost entirely used in Florence, partly for repairs to the cathedral and other churches of the city, and partly in making statuettes, bowls, vases and other ornamental objects.

With regard to the calcareous stone (*alberese*) some is cut into flags for street paving, and the remainder is employed in masonry in its original state, or else reduced into chippings and utilized in the metalling of roads.

The average output of these quarries is calculated at about £3,200 per annum.

The tuff is utilized as a very common building stone, the greater part being reduced into gravel.

The arenaria stone, including the varieties of "macigno" and "pietra forte," enjoys an excellent reputation as a first-class architectural and building stone; the largest output is obtained at Fiesole, Carmignano, Lastra a Signa and Galluzzo. The Fiesole quarries alone give an approximate annual output of £10,400. The total number of quarries is 1,300. This stone is frequently used outside Tuscany, and even exported abroad.

Comment on Timely Topics

THE UNION AND MACHINE CUT STONE.

WE are glad to notice a growing tendency on the part of the Union stonecutters to view the planer question from a common sense standpoint. At first there was an almost unanimous sentiment in the Union to fight the planers, but after the hotheads have spoken, the more conservative members are beginning to take a part in the discussion. In the current number of the "Stonecutters' Journal" there is a letter from a Union man in Toronto, Canada, voicing similar sentiments to those which we have frequently expressed in these columns. This man says that he is glad to see that others "realize the fact that to fight against a planer is to really fight against the progress of the trade, and would be Quixotic to say the least." We regret that the writer of this letter does not sign his name, as we should like to give him the fullest credit for his broad-minded views. He says:

"I think all stonecutters will admit that the cost of production is one of the most, if not the most, dominant feature involved in a selection of what material shall or shall not be used in the construction of certain buildings. We know, or at least think the average man of business or means prefers stone to any other material, both for looks and durability for his premises, business or residential. We also know that a building of stone would cost a trifle more, as a general rule, than brick or terra cotta, unless it was to be erected in a quarrying district. Therefore, to compete with these products of clay on more equal terms the cost of production must be curtailed as far as possible without (as too often is the case at present) taking it out of a stonecutters' muscle. And it is here that the centralizing of stonecutting, or, in other words, working the stone where it is quarried, comes to our assistance by obviating the necessity of paying freight on surplus stone. This state of affairs would tend to keep stonecutters to a certain extent within limits, which some of a traveling disposition would find hard to endure. The rising generation, again, would not have such a large sphere

in which to choose their life's labors, unless other works or factories were being run in the vicinity, and would therefore produce more stonecutters. In any case we would only stand where the colliers and iron-workers stand to-day, namely, in compact bodies instead of isolated few."

Many of the local branches of the Union seem to imagine that they are living in the dark ages, and that it is possible to wage a successful fight against modern progress. It is a pleasure to announce, however, that some of them are more enlightened and are protesting against the proposition to fight the planers. If the reactionists would only carry their antiquated ideas a little further they would see where it would lead them. If the Union is to oppose the planers, why should not the Quarrymens' Union object to the power drill and compel stone producers to return to the old sledges and hand drills? Why not fight against steam hoists and banish these in favor of hand cranes, which would give employment to a greater number of men? Indeed, why should not the Union protest against the carrying of stone by the railroad, so that the teamsters might be protected? It is hard to realize in this day of general intelligence that anyone can fail to recognize the fact that whatever tends to reduce the cost of stone construction will eventually bring about a far greater prosperity for the stonecutter. By statute we have forbidden frame construction within specified fire limits. We are now making a generous use of stone because of the vast wealth of the country and the unexampled prosperity. But there is nothing like the amount of stone construction in this country that is to be found in most cities of the old world. Brick and clay are accepted by architects and builders almost entirely because they are a cheaper substitute for stone and not because of any special liking for them. Thanks to the ingenuity of Americans, we have greatly reduced the cost of quarrying stone, despite the fact that we pay wages far in excess of Europe. By the use of planers and pneumatic tools we are reducing the cost of dressing stone, and before another decade shall have passed we can expect to make stone construction the standard for all large business and public buildings. Do the stonecutters wish to prevent this? Can they not see that their prosperity lies along this line, and not in adopting reactionary methods in order to gain for a few more men temporary employment? By united efforts the stonecutters may succeed in putting a temporary limit on planer work, but by no possible means can they add to the amount of stone construction, if the cost is needlessly increased for their sole benefit.

Eldridge & Sterritt, contractors, of Ossining, N. Y., have forty men at work quarrying stone at the St. Gabriel's stone quarry, near Peekskill, for the new monastery to be built there.

John Pallen & Son are opening a quarry near Martinsville, Kentucky. While quarrymen were stripping they found the skeleton of a man, with nothing to indicate his race or how he came to his death.

A porphyry quarry is to be opened at West Point, Mississippi. It will be used for ballasting and also for building stone.

A new stone quarry has been opened at Hibernia, New Jersey. It will be worked all summer, getting out stone for a new furnace to be erected at Port Oram.

The Cunard Stone Quarry near Fulton, Ohio, owned by J. C. Fairchild, has been leased by Henry Mosher, and will be operated the coming season. It has been closed for several years.

The Mount Pleasant Quarry Co., of Portland, Maine, has been organized for the purpose of quarrying stone and all kinds of minerals. Capital stock, $60,000. Officers: J. F. Connor, president, Pittsfield, Maine; treasurer, A. A. Brackett, of Milton, Massachusetts. The company owns twenty-two acres of granite land near Boston.

The flint mills near Conowingo, Cecil County, Maryland, and the flint quarry in Harford County, have been sold to Norman G. Smith for $6,850.

A. C. Stanley, R. L. Leitch and A. S. Goodell have purchased the interests of H. A. Neer and John Grady, in the Northwestern Stone Quarry, at Sterling, Illinois. The new proprietors have begun operations.

Gaynor Brothers, who have a large Government contract at Lorain, Ohio, will operate their stone quarries at Johnson's Island, near Sandusky, with an increased force of men this season. Last year about forty men were employed, but it is expected that from 150 to 200 men will be needed this year. Laborers are at work stripping a new tract.

Complaint is made that the blasting in the city quarry at Hartford, Connecticut, is seriously injuring the buildings of Trinity College, which are from 400 to 500 feet distant. The city officials say that quarrying has been going on in this spot for a hundred years, and that during the twenty-five years that the college has been located there, complaints of damage have not been made until the present season.

County Treasurer Lawrence Tarleton, of Weatherly, Pennsylvania, and C. A. Mans, of Hazelton, have leased what is known as the Tweedle and Yeakle tract of stone land at Black Creek Junction at Weatherly. They have formed the Carbon Brownstone Co., and will begin quarrying stone on an extensive scale. A siding from the Lehigh Valley Railway will be run to the quarries, and a large tract will be stripped. A complete equipment will be put in and about twenty-five men will be employed at the start.

The Klondike Quarries, between Cobleskill and Barnersville, New York, has been shut down for some time, owing to a disagreement between the owners. A receiver has been appointed and the plant is to be sold. The quarries contain a large quantity of fine building stone.

The H. M. Dalton Rock Co., of Hopkinsville, Kentucky, has been incorporated at Indianapolis, with a capital stock of $45,000. The officers are: President, C. P. White, of Boonville, Indiana; vice-president and general manager, H. M. Dalton, of Hopkinsville; secretary, John P. Weyerbacher, of Boonville. The company owns 150 acres of quarry land.

The Horseshoe Quarry Company have

lately opened up a new stone quarry at St. Marys, Ont., from which can be obtained unlimited quantities of stone of excellent quality. The proprietors have built a switch three-quarters of a mile in length, connecting the quarry with the main line of the Grand Trunk Railway, and are thus in a position to supply any quantity or size of stone required.

Davis & Harris have sold their quarries at Hoytdale, Pa., and are moving their machinery and fixtures to Neshannock Falls, where they will operate an extensive and up-to-date quarry.

G. H. Fisher, James G. Hunter and Verne Young have incorporated the Wabash Stone Company with a capital stock of $60,000. They have leased twenty-five acres of stone land at Long Run where they will open quarries. Switches are now being put in. In connection with the quarry Mr. Fisher will open a stone yard at Steubenville.

George R. Hoffman expects to open a new stone quarry at Virginville, Berks County, Pa.

Hugh Young, C. F. Metcalf and Robert Kelday have incorporated the Quarries Operating Company, of Chicago, with a capital stock of $20,000.

G. W. Shull & Son have bought the McGrillis quarry near Holly, N. Y.

The Miami Stone Company, of Toledo, Ohio, has purchased fifty acres of stone land adjoining its quarries at Waterville, Ohio. The company bought the additional land for the erection of its plant. As a side issue an oil well was drilled and when this was shot, a large flow of oil followed.

N. R. and W. G. France, extensive operators in building and crushed stone at Bloomville, O., have purchased about forty acres of land near North Baltimore, Ohio, from M. E. Dirk and Michael Henning. This contains an immense bed of stone suitable for macadam and ballast purposes. A stone crushing plant will be erected at once having a capacity of 500 yards a day and employing 75 men.

A suggestion is made that North Adams, Mass., purchase a city quarry in order to furnish employment for destitute men.

The quarries at Dickersons, Md., operated by Baker Bros., for the furnishing of crushed stone for road-making in the District of Columbia will open about March 15th. A considerable amount of new machinery will be installed.

The North Baltimore Stone Company, of Toledo, Ohio, has been incorporated to quarry stone, macadamize roads, etc., with a capital stock of $12,000. The incorporators are A. W., L. A. and E. H. Eckert, Hiram C. Nicholas and W. W. Brown.

Ed. D. Farrell, of New York, has been appointed receiver of the Cobleskill Quarry Company.

White Statuary Marble in Egypt.

About ninety miles W.S.W. from Luxor, and fifty miles from the Red Sea coast, near the ruins of the ancient settlement of Abu Geraia, are some extensive and most interesting ancient marble quarries, one mile north of Wady Mia. Here an outlier of limestone on the granite has been converted into a beautiful white statuary marble, resembling that of Carrara, by the intrusion of dykes of felsite and greenstone—the latter penetrating the marble mass, and the former adjacent to and in contact with it, on the west side. Enormous heaps of chippings show that the marble had at one time been extensively worked, but, with the exception of one fragment of a broken vase, no worked pieces could be found. The neighboring country is generally talc schist and gray granite, and the occurrence of this marble mass at so great a distance from any rock of its kind is an interesting geological problem. For years Egyptologists have been puzzled by the existence in many ancient buildings throughout Egypt of a white crystalline marble of great purity and beauty, the original source of which was quite unknown. Many ancient monuments were, therefore, perforce left unrepaired by the Committee for the Preservation of Arab Monuments, as the use of European marble beside the ancient portions would have destroyed the symmetry of the effect. Here at last the long-sought marble was found, and the matter has been warmly taken up by the architect of the committee. Unfortunately, the distance of the quarries from the Nile renders the cost of transport, which at present has to be done entirely by camels, so high that, in spite of its superior quality, this marble has little chance of competing in the market with that from Europe.

Lichen on Stone Buildings.

The green or black covering which forms on light colored stone after some time has been found by Dr. Fruhling to be a lichen, and if once developed is hard to remove. Its formation, however, may be prevented by painting the stones with a diluted sulphide of potassium solution at intervals of one year. Leitzmann has attempted to wash off the houses with hydrochloric acid, and found that this was effective for three to six years.

Marble and Granite

The Gray Eagle Marble Co. has been incorporated at Knoxville, Tennessee, with a capital stock of $20,000. The company owns 100 acres of marble land known as the Webb farm. The incorporators are: Harmon Kreis, W. R. Monday, J. B. Jones, J. S. Hall, Jr., and John H. Davis.

There is a great deal of activity at the Hallowell granite quarries and 180 cutters are at work there and 200 at Frankfort. It is expected that the cutting of the Chicago post office and court house building will be finished on or about the first of June.

Stephens & Gerard are building a new cutting shed, 122 x 59 feet, on Smith meadow, Barre, to be completed April 1. It will have a traveling crane and all modern improvements.

William W. Jones, for many years a dealer in monuments at Utica, is dead at the age of 53 years.

M. G. Ryan & Co. have two gangs of cutters at work on their quarry at the Settlement, Stonington, Maine.

John L. Goss has closed contracts which will keep his quarries at Moose Island at work until spring.

The Marble Works of Philip Mindel, at Lyons, N. Y., was totally destroyed by fire.

Efforts are being made to open the Oak Hill Granite Co. at Swanville, Maine. The granite is blue gray in color and was formerly in large demand for monumental work. The quarry has been closed for some years.

The Mount Pleasant Quarry Co., of Pittsfield, Maine, has been incorporated, with a capital stock of $60,000. The company owns twenty-two acres of Quincy granite land near Milton, seven miles from Boston. A force of men is now at work opening up the quarries.

The polishing mills and cutting sheds of Robert M. Fraser, at Montpelier, Vt., were totally destroyed by fire. They contained considerable finished stock. The loss is $12,000, with only $3,000 insurance.

Bickford & Moore, of Hardwick, Vt., have secured a contract for granite to be used in the Lake Shore and Rock Island Union Terminal Station at Chicago. From 350 to 380 carloads of granite will be required, and it will require a force of about 150 men to complete the job in nine months.

Michael Delaney has bought property near Lenox Dale, Mass., and will open a marble quarry.

The American Coral Marble Co. has been incorporated at Tacoma, Wash., with a capital stock of $1,000,000, to develop marble claims on the Prince of Wales Island, Alaska. The incorporators are: W. H. Remington, L. J. Pentecost, Sidney Plummer and Walter M. Harvey, of Tacoma, and Francis Clarno, F. O. Downing and E. A. Baldwin, of Portland.

The main building of the stone works of William Gray & Sons, at Thirtieth and Locust streets, Philadelphia, was almost totally destroyed by fire, with a loss of $20,000.

Dwight R. Startup has purchased the Liberty, N. Y., Marble and Granite Works from Henry C. Bloomer.

The marble and granite firm of Wallace & Earle, at Malone, N. Y., has been dissolved, and Mr. Earle will continue business alone.

The granite firm of Fraser & Craven, at Montpelier, has been dissolved, and the business will be continued by E. E. Craven.

A large amount of rough stone is being shipped from the quarries at Stonington, Me., this winter. Two or more boatloads are sent nearly every week from the Settlement quarry, while it is a common occurrence to see three or four large vessels waiting for a chance to load at the Crotch Island quarries.

Again there is talk of the combination to take in several of the granite companies in New England. It is said that New York financiers are interested in the scheme.

Morrison & Whitney, operators of the recently opened marble quarries on the Barney Hall farm, near Gouverneur, N. Y., have taken a large contract for a magnificent marble residence to be erected in Clyde, N. Y., this spring. Extra machinery will be installed at the quarry at once.

The Gouverneur Cut Stone Co. have suspended work at their quarry until spring, when they will open up a larger area. Business continues very lively in their monumental finishing shop.

The New England Granite Co., of Concord, N. H., has been awarded the contract of the granite work of the Blackstone library, to be erected in Chicago. The company has enough work already booked to keep it running to its full capacity all next season.

There was recently shipped from North Jay, Me., an immense block of granite to be used in the Smith memorial fountain at Philadelphia.

The Empire Marble & Onyx Co., of Spokane, Wash., has purchased four additional claims, consisting of forty acres, near Chewelah. The marble is of many colors, including green, yellow, black, drab, dove, red and mottled.

The Great Western Marble Co., of Spokane, has discovered in its quarries on Blue Creek a variety of stone that it claims is identical with the famous Verona Italian marble.

The Smith Granite Co., of Westerly, have the contract for a soldiers' monument to be erected for the Rhode Island Soldiers' Home at Bristol, and for the monument to be erected by the State of Connecticut at Norwich, in memory of the 26th Infantry.

Mr. Harry Dewar has been re-elected president and treasurer of the Blue Ridge Marble Co., of Nelson, Ga., and Mr. A. Anderson, general manager. Among the large contracts recently secured by the company is one for the marble work in the new Century Building, at Atlanta.

The Columbia Marble Co., of Spokane, expects to install $6,000 worth of machinery at its quarries near Chewelah, in the spring.

About forty men are now employed at the Hinchliffe Granite Quarries, on Pochuck Mountain, getting out stone for the new reservoir for Newark. The force of men will be largly increased in the spring.

More than 90 per cent. of the granite manufacturers of Barre, Montpelier and Northfield have signed an agreement putting in effect the new "central office" plan. This means that all estimates on granite work shall pass through the exchange, which will figure the actual cost on the work. The manufacturers will then add their percentage of profit in making bids.

Maryland Granite for the Baltimore Custom House.

The contract for the construction of the new Baltimore Custom House has been awarded to Henry Smith & Sons, of that city, at $792,372. It is a satisfaction to announce that Maryland granite is to be employed in the construction of the building. The architects, Messrs. Hornblower and Marshall, made a careful inspection of the native stone in comparison with Maine granite and also examined a number of striking buildings in which Maryland granite has been employed. The choice of this stone is a tribute to its quality. The quarries at Guilford are well equipped and they have enough work to keep them busy for some months to come.

Kingston Coronation Stone.

One of the most interesting relics preserved at Kingston, England, is the famous Coronation Stone. An account of this was given by Mayor W. E. St. L. Finny, of Kingston, in his inaugural address. In a passage of the "Anglo-Saxon Chronicle," he said, penned by one Ethelwird, it is written that the successor of Alfred the Great, King Edward the Elder, was chosen king in the year 901 and crowned on Whit Sunday, 902. The stone at Kingston bears graven upon it the names of the kings who stood thereon to receive the crown, and among these old Saxon names is that of Edward the Elder. Now, Edward the Elder, the first King Edward of England of whom history tells, is likewise the first king of whose coronation we know. A thousand years precisely have elapsed between the accessions of King Edward the Elder and of his present Majesty, King Edward VII. Precisely 1,000 years will have passed between their coronation. Edward the Elder succeeded a ruler of great fame, to whom history has willingly accorded the title of "Great"—King Alfred. Edward VII. also succeeds to a monarch of no mean fame. In the 1,000 intervening years fifty kings and queens have held sway in England, and for each and all we have a record of the coronation since the day when Edward the Elder stepped upon the old gray stone at Kingston market-place. A record so long and unbroken as this is without parallel in Europe. It is not strange that Kingston-on-Thames looks with peculiar pride and interest upon the stone which saw the beginning of the long list of English coronations. The town has also ancient honors. King John gave it its charter; King James II. bade its chief magistrate call himself mayor. Alone, or almost alone, among English towns, it possesses a recorder and high steward elected by the people. Not least among these reasons for pride it places its ownership of the stone whereon the King Edward whose blood runs in the veins of our own Edward VII. was crowned 1,000 years ago.

German Artificial Clay.

Consul-General Guenther writes from Frankfort:

Artificial clay, according to German papers, is receiving increased attention abroad. This ceramic novelty, which is used for the manufacture of artificial stone tiles, gutters, etc., is composed of sand, chalk, cement, liquid glue, and petroleum. The substances are mixed in certain quantities and a clay-like mass results, which can be formed at pleasure and acquires an excellent degree of hardness by being subject to heat.

This artificial clay can be employed in a variety of structures; tiles of different forms and sizes are made of it. They have a perfectly even surface and sharp edges, are fireproof, and resist the influences of the weather; they furthermore absorb no moisture.

The clay is also used for the manufacture of artificial stone in all colors. Tests with this clay have been made at the laboratory of the Technical Experimental Station at Charlottenburg, and the results have been pronounced very favorable.

As the substances are easily mixed without the aid of machinery, the smallest builder can use the process and so obtain structural decorations at a low price.

Novel Building Construction.

A building is now in course of erection in Birmingham, England, that presents some novel features in construction. The plot has remained unoccupied for many years because the tunnel of the Great Western Railway runs three feet beneath the surface of the ground and will not bear any more weight than is at present upon it. The architect has now planned a building which meets these objections. The building is three stories in height and 25 feet of it will project over the tunnel, carried on huge cantilevers, six in number. A mass of concrete, 16 by 15 feet, and weighing 160 tons, hangs suspended from the other end of the cantilevers as a counterpoise.

Limestone and Sandstone

The Pioneer Red Stone Co., of Marquette, Mich., has been incorporated, with a capital stock of $33,000.

The Independence Stone Co. has purchased thirty-two acres of quarry land at Independence, Ohio, including an eight-gang sawmill, quarry and machinery. This, in addition to its other possession of 77 acres adjoining, gives it one of the largest and best equipped quarries in that part of Ohio. The mill was formerly operated by Little & Pettibone.

The Ridgway Sandstone Co., of Ridgway, Pa., has been incorporated, with a capital stock of $20,000.

The Norwalk, Ohio, Stone and Brick Co. has been incorporated, with $10,000 capital, succeeding the firm of Stewart & Simmons. George S. Stewart is president and E. B Simmons, treasurer.

Sherman & Flaven, of Chicago, has been incorporated, with a capital stock of $100,000.

The Wright & Tripp Stone Quarry Co., of Belvidere, Ill., will install new machinery in its quarry in the spring.

The Pecos Sandstone Co., of Barstow, Reeves County, Texas, has been incorporated, with a capital stock of $25,000.

The Conemaugh Stone Co., Cresson, Pa., has purchased the Whittaker stone quarries at Blooms Run. The plant will be greatly improved and run to its fullest capacity in the spring.

The Carlucci Stone Co., of Scranton, Pa., has elected Conrad Schroder, president, and Frank Carlucci, vice-president and general manager.

The Croton Lime, Stone & Brick Co., of Newcastle, Pa., has been incorporated, with a capital stock of $30,000. Directors: Alexis W. Thompson, J. C. McCready and S. S. Pearson.

W. F. Mitchell, of Williams, Indiana, is working to develop a ledge of lithographic stone near that place. The stone is of the blue variety and very dense. Considerable lithographic stone has been found in Lawrence County, but it has not been sufficiently free from flaws to be marketable.

The F. W. Menke Stone and Lime Co., of Quincy, Ill., has been awarded the contract for the stone work on the new addition on the Dayton Tablet Works.

A considerable order for blue stone, to be used in a new public building at Havana, Cuba, has gone to Oxford, New York.

An official connected with the United States Geological Survey declares that Pennsylvania last year produced 15 per cent. more limestone than the previous year.

The Acme Stone Company, which is owned by Chicago capitalists, and whose plant is located five miles south of Bloomington, Ind., has just closed a contract for the stone for a large building in New York. The job amounts to about $100,000, and will keep forty stone-cutters at work for several months. The company expects to run a day and night force until the contract is completed. Joseph Jones is superintendent of the plant.

Nicks' limestone quarry, near Kutztown, Pa., which has been idle for many years, has been leased and will be operated at once. It is said that the stone will be used for cement making.

A contract has been given to J. A. Coleman for the erection of stone mills and 500 feet of elevated tramway for the American Quarries Co., on Fishing Creek, near Mitchell, Ind. When the quarry is fully developed it will be one of the largest in the entire Indiana limestone region.

The Brokensword Stone Co., of Bucyrus, O., reports that its business for the past year was very satisfactory and that the quarry is so equipped that it will be able to handle all of its business promptly.

The Pittsburgh Limestone Co., Ltd., has purchased twenty acres of limestone land, 2½ miles southeast of Martinsburg, W. Va., and will at once open new quarries, operating them extensively. A branch of the Baltimore & Ohio R. R. will be built directly to the quarries.

John Torphy, superintendent of the Perry, Matthews and Buskirk quarries, at Bedford, has secured options on 1,500 acres of stone land in Lawrence County, Ind. Mr. Torphy says that the stripping is not heavy and that the land is easy of access from the railroad. He thinks the stone is fully equal to any in the Bedford region.

Stone Trade Notes

The Quincy Quarry Co. is expending considerable money getting its quarries into shape for increased production in the spring.

Wallace & Earle, dealers in marble at Malone, N. Y., have dissolved partnership, Mr. Earle having purchased the interest of his partner.

Henry E. Nelson, of Cherry Valley, N. Y., has opened granite and marble works at Little Falls, N. Y.

It is reported that the Fletcher Granite Co. will soon resume the operation of its big quarries at Woodbury, Vermont.

The capital stock of the Zeran Marble and Granite Works of Cairo, Ill., has been increased to $25,000.

The Milford Granite Company, of Milford, N. H., has declared a dividend for the last six months. During the past year it has paid out for labor $33,000. The company was organized in 1897, and has done much to develop the granite business of the town.

The New England Granite Works, which has had an office on Main street, in Hartford, for forty years past, has removed to Asylum street, in the Batterson Building. J. G. Batterson, son of the late J. G. Batterson, is now president of the company.

A. Bernasconi & Co., granite cutters, of Berlin, Vermont, have filed a petition in bankruptcy, giving their liabilities at $1,616.43; assets, $1,130.

The marble mills which are being built by the F. R. Patch Manufacturing Company, for the Columbian Marble Quarry Co. at Rutland, Vermont, are nearing completion.

A. W. Libby has sold his marble and granite plant at Buckfield, Maine, to Horace Murch.

The American Chemical Brick & Stone Co., of Jersey City, has been incorporated under the laws of New Jersey, with a capital stock of $500,000, to manufacture brick and artificial stone. The incorporators are: Joseph O. Beauchamp, Charles M. Pomerat, Joseph Masse, and K. K. McLaren.

The crushing plant of the Decarbonated Lime and Stone Co., at Waynesboro, Pa., is being operated to its utmost capacity.

R. A. Thomassen, who has been operating stone quarries near Fayetteville, Ark., for the past 15 years, has received many orders for stone and expects a large increase of business in the spring.

Miller Bros. & Johnson, who have a stone mill at West Superior, Wis., are considering the removal of their plant to West Duluth, Minn.

The Western Stone Co., of Chicago, during 1901 earned $17,794, or .0079 per cent. on its stock. In 1900 the company lost $66,459 of its surplus. President Madden announced to the stockholders that a great deal of work had been done during the year of a preparatory nature, in anticipation of its future needs. The expenditure for this work, which is now completed, has been charged to the expense of production and amounts to $125,000.

The Noel Construction Company has been incorporated at Baltimore, Md., by Messrs. E. M. Noel, David W. Thomas, J. D. Kline, Moses Pel and J. Kemp Bartlett. The capital is $250,000. The company will do a general contracting and construction business.

The Brandywine Granite Co., one of the largest and best known stone companies in the South, has decided to close its plant on the Brandywine, in Delaware, and go out of business. Recently the company was compelled to pay $9,000 damages to an Italian who was injured by a premature blast at its quarries. The directors of the company declare that under the decision of the court a company engaged in a hazardous business cannot continue operations in Delaware. The quarries are now being cleaned up and the machinery will be sold.

The Norris-Christian Stone & Lime Co., the Norris-Christian Lime & Stone Co. and the Lime City Real Estate Co., of Marion, O., have re-elected the old board of officers, with George B. Christian as president and C. H. Norris as vice-president. Save in name alone, the three companies are identical. The business for the past year was reported to be very satisfactory.

H. O. Duerr, who recently resigned the presidency of the company which operates a big stone crushing plant near Leroy, N. Y., proposes to establish a new crushing plant on N. Main street, Buffalo.

E. L. Fuller, of Scranton, president of the International Salt Co., is to be president of the new crushing company.

The New Building at Annapolis.

The new cadets' quarters at Annapolis, Md., the contract for which was awarded to Noel & Thomas, as announced last month, will be one of the largest buildings in the United States. The main part of the building will be 620 feet long, with the boathouse on the east and the armory on the west connected by colonnades 100 feet long. This will make one architectural unit 1,278 feet long. This is more than one-third longer than the Capitol at Washington and twice as long as the Congressional Library. The building will have a width of 456 feet 5 inches. The first story will be built of granite and the other four stories of buff brick with granite trimmings. It will be divided into various pavilions, the principal one being the stairway pavilion, which will lead to a memorial hall. This occupies the central portion, extends from the second story to the roof, and will be the principal architectural feature of the building.

The union stone cutters, blockmakers and quarrymen of the Medina sandstone district of Western New York have made out a new scale of wages for piece work, to go into effect April 1. The minimum wage for quarrymen is 20 cents an hour, 58 hours to constitute a week's work. Stone cutters are to get 40 cents an hour for an 8-hour day.

Finch & Clark have begun operating their stone crusher at Sandy Hill, N. Y.

William L. Conway, dealer in stone and building material, at 554 West Farms road, New York, has filed a petition in bankruptcy, with liabilities of $12,009.04; assets of about $7,000.

The Diamond Hill Broken Stone Co., of 765 Broad street, Newark, N. J., has been incorporated, with a capital of $150,000, to manufacture crushed stone. Incorporators: Geb. F. McGuire, Edward E. Dean and Nathan F. Giffin.

Young & Sons, granite dealers, of Milford, N. H., and Troy, N. Y., brought suit in the United States Circuit Court, at the latter city, against Dennis Daley, of Cohoes, a monument dealer, for infringement of patent for a sarcophagus monument design. The court retrained the defendant from further use of the design, and awarded the plaintiff $250 damages.

The correspondents of *Bradstreet's* report that the marble and slate interests of Vermonts are very active. Poultney reports an active slate business for this time of year; quarries are being worked when the weather is suitable and there is a good demand for the product; retail trade is satisfactory. Granite business appears to be improving in Barre; the larger sheds have plenty of work on hand, and the demand for stone at quarries is greater than can be immediately supplied. Retail trade is satisfactory and collections fair.

The United States Marble Company proposes, in the event that the Spokane Chamber of Commerce will secure subscriptions for 50,000 shares of its stock at 75 cents per share, to build a mill in Spokane that will cost about $75,000 and give employment the first year to thirty men.

P. C. Foley, the well-known marble and granite dealer of Olean, N. Y., is candidate for mayor of that city.

The Schumacher Building Stone Company, of St. Louis, Mo., has been incorporated, with a capital stock of $130,000. Incorporators: Johannes Schumacher, W. Janisch and F. H. Lowry.

There was a brief strike of the employees of the Columbian Marble Quarrying Company, of Rutland, Vt., owing to the objection of the men to the foreman of the polishing shop. The foreman was removed, and the men returned to work.

A Big Blast in a Welsh Slate Quarry.

A big blast took place recently at the Talysarn Slate Quarry. About two dozen holes, ranging in depth from 12 to 15 feet, had been bored in a huge mass of granite which had to be moved in order to get at the slate bed below. The pit in which these operations were carried out is one of many in the quarry, being the largest and deepest. This pit covers about eight acres of land, and is 120 yards deep. The side where the blasting took place is almost perpendicular, the men having to work on ropes in several places. Above is the engine room, and it was feared that the blasting might bring it down. Besides this possibility, the work was, in itself, tremendous, as it would mean the removal of many thousand tons of stone. Mr. Robinson, the owner, however, with characteristic energy, decided upon untopping the quarry, an enterprise which will cost at least £10,000 before it is finished. About twenty pounds of dynamite was placed in each hole, and, when the fuse had been lighted, the men could be seen climbing the rock, with remarkable speed, to a place of safety. About seven shots were fired, and the rest will be fired again. The noise was deafening, and thousands of tons came down. Large pieces of stone were thrown great distances, huge masses of rock were loosened, and seemed to hang for a moment on the brink, and then crashed down to the bottom with tremendous roar. The spectacle was a magnificent one. To "fire" all the holes would require over half a ton of dynamite.

Opposed to Sky Scrapers in Chicago.

A committee of the Common Council of Chicago reported to a recent meeting in favor of the granting of special permits for the erection of three sixteen-story structures and one fourteen-story building. The Council, by a vote of 35 to 30, refused to grant the permits and unless further relief is obtained the buildings will be limited to 132 feet, or not to exceed ten stories in height. One of the proposed buildings was for the First National bank, another for the Tribune Company, and another for the Hartford Deposit Company. One of the reasons given by the aldermen for their action was that the outlying business was damaged and prices of property lowered by the congestion of business downtown.

Monumental News

The women of Detroit are to make a determined effort to raise funds for the Cadillac memorial in that city.

A movement has been started in Washington for the erection of a monument in that city to the colored soldiers who sacrificed their lives for the country during the war with Spain.

Ryle & McCormick, of Montpelier, Vt., have received a contract for a large monument for New Jersey. It will have a total height of 45 feet, and will weigh 85 tons.

Dane County, Wis., wishes to erect a fine soldiers' monument at Madison. It is believed that if the county appropriates $10,000, at least twice that amount can be raised by private subscriptions.

David Baughman, of Cincinnati, has endeavored to have the Ohio legislature pass a bill providing for a standard monument for the State, requiring all memorials to be erected in accordance with the bill. He also wants the cost limited and all persons forbidden to erect their own monument. The reason for this proposed law is that some time ago Mr. Baughman erected a costly monument to himself and now he concludes that it was foolish to spend so much money for such a purpose.

W. A. Salladin, of Canandaigua, N. Y., has been awarded the contract for a fine monument to be erected in memory of the late Rev. Dennis English.

The Lincoln Birthday Association has presented to the Buffalo Historical Society a bronze statue of Lincoln costing $10,000, modeled after the statue by Charles Niehaus.

The town of Webster, Mass., has $1,500 for a soldiers' monument, but the erection of the memorial has been delayed for three years by a dispute concerning the site.

The Troy White Granite Co., of Worcester, has been awarded the contract for the erection of a soldiers' monument in Prospect Hill Cemetery, Uxbridge, Mass.

The commissioners of the Vicksburg National Military Park Commission have invited the State of Virginia to erect a monument on the battlefield to commemorate the valor and services of the Botetourt Artillery.

Bishop Edsall, of Minnesota, makes an appeal for funds for the completion of the memorial tower erected in memory of the late Bishop Whipple at the Cathedral of our Merciful Saviour, at Faribault, Minn.

A monument will be erected in Pittsburg in commemoration of Colonel Hawkins.

The Scotchmen of Pittsburg are considering a project to erect a $50,000 statue to Burns.

The Catholics of Binghamton, N. Y., propose to erect a handsome monument in memory of Fathers Hourigan and Quinn.

The Harrison Granite Co., of Barre, has been awarded the contract for a mausoleum for the late Marcus Daly, the Copper King of Montana, to be erected in Greenwood Cemetery, Brooklyn. It will be nearly square, with a central repository over the crypt, surrounded with 24 fluted Ionic columns with carved capitals. The top will be dome-shaped.

A bill has been introduced in Congress for a $50,000 monument in the District of Columbia to General Steuben.

Merrill, Wis., is raising a fund for a soldiers' monument.

Naples, N. Y., has $1,000 in hand for a soldiers' monument.

Hamilton, O., proposes to build a combined soldiers, sailors and pioneers monument and memorial hall of Bedford stone at a cost of $47,000.

The Daughters of 1812, of Harrisburg, Pa., will erect a monument to Frederick Durang, of that place, a veteran of the war of 1812, who wrote the music for "The Star-Spangled Banner."

A bill has been introduced in the Pennsylvania legislature for a $50,000 monument in Lancaster County to Thaddeus Stevens.

A bill has been introduced in Congress for a statue in Peterborough, N. H., in memory of Gen. James Miller, of that place, the hero of Lundy's Lane.

A movement is on foot in New England for the erection in Harpswell, Me., of a memorial to the late Rev. Elijah Kellogg, the famous juvenile writer.

The United States Senate Library Committee recommends the erection of a bronze statue of Longfellow in Washington.

A bill has been introduced in the New York legislature for a $30,000 statue of Alexander Hamilton in Capitol Park, Albany. No Revolutionary hero has met with greater neglect than Hamilton.

Carthage, N. Y., will erect a soldiers' monument. Dr. Charles S. Drury, chairman.

Buffalo proposes to erect a monument to

the late William McMillan, superintendent of parks in that city.

It is said that repairs to the Saratoga monument at Schuylerville, N. Y., are urgently needed.

Media, Pa., proposes to erect a $15,000 soldiers' monument.

The Confederate veterans of Bamberg County, S. C., have organized for the erection of a soldiers' monument.

Middle Springs, Pa., is raising funds for a soldiers' monument. The Middle Spring Presbyterian Church sent out more men to the Colonial, Revolutionary and War of 1812 than any church in the United States.

A statue of Major General Henry W. Slocum has just been completed in Paris by Macmonnies, and will soon be erected in Prospect Park, Brooklyn.

A bill was introduced in the Pennsylvania Legislature, appropriating $50,000 for the erection of the monument in Lancaster County, to Thaddeus Stevens.

Naples, N. Y., has already $1,000 in hand for the erection of a soldiers' monument.

The 34th New York Volunteer Regiment will erect a monument on the battlefield of Antietam.

Joel Covington, a venerable citizen of Bennettsville, S. C., has erected a monument to himself and his wife in the local cemetery and has had graves dug and walled up, awaiting the death of both.

The monumental business carried on for some years past at Hartford, Conn., by Stephen Maslen, has been incorporated under the name of the Stephen Maslen Corporation of Hartford. The capital stock is $25,000 and the incorporators are Stephen Maslen, who holds most of the stock; Charles C. Maslen, and H. L. Maslen.

A monument has been erected at the National Soldiers' Home, in the town of Wauwatosa, Wisconsin, to the memory of those who participated in the wars of the country. A considerable sum has already been raised.

An imposing monument will be erected in France in honor of Pasteur.

The Maryland Legislature is discussing a bill appropriating $10,000 for a monument to the heroes of the War of 1812 on the North Point battlefield.

The Christian Brothers have erected a statue of St. John Baptist de la Salle in memory of deceased brethren in St. Agnes Cemetery, Albany. The statue is cut from "Blanco P." and Bardiglio marble.

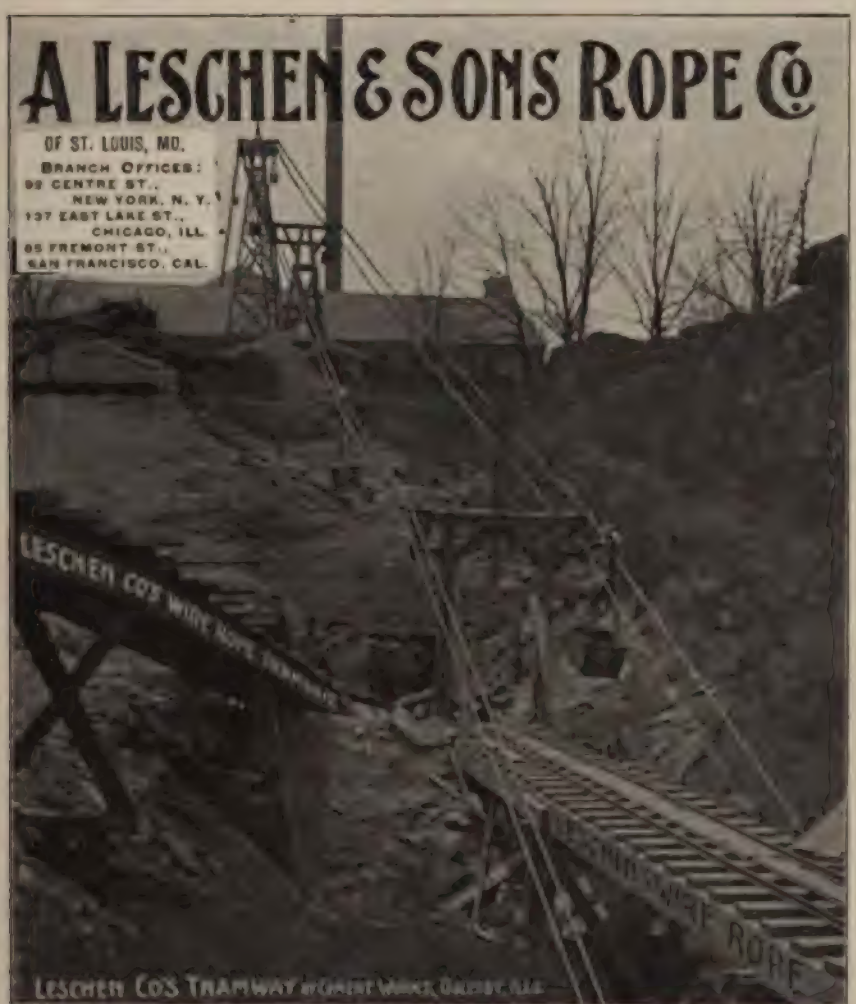
It is proposed to erect a $15,000 soldiers' monument in the court house square at Media, Pa.

A Greek temple mausoleum is to be erected in Mt. Nebo Cemetery, Paterson, N. J., by Nathan Barnert. It will be of granite, lined with polished Italian marble, and will cost $20,000.

The Blue Marbles of Pennsylvania.

For many years the unfading blue marbles of Pennsylvania have been held in high favor for building purposes. Blue is always a desirable color in marbles, but the great trouble with most of the deposits of this variety of stone is that it will not hold its color when exposed to the weather. Many blues, both light and dark, that are very attractive when newly quarried, fade into a dirty gray after a few years. The marbles that are quarried by Messrs. Schweyer and Liess, at King-of-Prussia, Pa., are absolutely unfading, either in the light or dark blues. They have stood the test of many years and have never given disappointment in texture or color. The proprietors of the quarry worked them for many years entirely for the building trade and the marble has been used in some of the largest and handsomest buildings in Pennsylvania. The fact that this marble is unfading and that it takes and holds an excellent polish suggested its use for monumental purposes and within the past year or two it has been introduced to the monumental trade by D. J. Whitney, of Gouverneur, N. Y. It met with instant favor and the business is increasing rapidly. There is considerable variety in color, no less than seven being shown. These range from a light dove color to a very dark blue. The marble is all beautifully clouded, either with white or with clouds of a darker tint than the prevailing color. The introduction of this marble for monumental purposes is a distinct gain to the trade. For building purposes both the light and dark blue are effective, when either color is used singly or in combination. There is a great deal of life to the stone both when it is tooled and when it is rock-faced.

Messrs. Schweyer and Liess have secured the contract for the marble to be used in the addition to the Norristown, Pennsylvania, Court House. This will require from 40,000 to 50,000 cubic feet. The company is under progressive management and the quarries are well opened and intelligently worked. The deposit is sound and the marble is not burdened by large top requiring stripping. A number of improvements in the equipment have recently been made, and there is now in contemplation a new mill in anticipation of the growing demand for the unfading blue marble.


A LESCHEN & SONS ROPE Co.
OF ST. LOUIS, MO.
BRANCH OFFICES:
92 CENTRE ST.,
NEW YORK, N. Y.
137 EAST LAKE ST.,
CHICAGO, ILL.
65 FREMONT ST.,
SAN FRANCISCO, CAL.
LESCHEN CO'S WIRE ROPE TRAMWAY

The Slate Trade

The slate trade in the Slatington region for the year just closed, shows a remarkable increase in the production of roofing slate over the output of the previous year. The demands have exceeded the supply, which meant that prices were well maintained throughout the season. The shipment of school slate also showed a decided gain, while there was a considerable decrease in the demand for blackboards.

The plant of the South Western Slate Co., at Mena, Ark., is now ready for operation and several orders for structural slate have been received and accepted.

Work has been resumed at the old Hood Slate Quarry, at Rockmart, Georgia. A busy season is anticipated in this region.

New machinery will be placed in the factory of the Madoc Slate Co., at Harper, near Danielsville, Pa. It will double its output.

The Auld & Conger Company has been incorporated at Columbus, Ohio, with a capital stock of $150,000. The incorporators are: D. Auld, Jr., J. W. Conger, J. A. Smith, F. L. Taft and E. A. Williams.

The Atlas Slate Company, of Mena, Ark., will try the experiment of putting out red slate "black" boards for schools. The company claims that the red color will be easier on the eyes of the pupils than black. The Arkansas slate has excellent cleavage.

The New Jersey Slate Company, Newton, N. J., has received a large government contract which with require several months to fill.

The Snowdon & Bangor Slate Co., of Slateford, has elected the following officers: President, Joseph F. Wilson, of Belvedere, N. J.; vice-president, Mark O. Shrever, of Baltimore; secretary and treasurer, Frank A. Large, of Belvedere. The company has commenced to enlarge its quarry by taking off 110 x 175 feet more top. The company will lease the quarry for a term of five years from April next.

The Modoc Slate Co., operating quarries at Harpers, near Danielsville, Pa., has elected these officers: President, C. R. James, of Allentown; vice-president, Lloyd C. Haynes, of New York; secretary, William H. Rodgers; treasurer, Dr. Samel Bolton, of Philadelphia.

The Monson Main Slate Co. are so overrun with orders that they are running their mill at the Monson Pond quarry on extra time.

Michael Keenan has sold his interest in the slate business of Durick, Keenan & Co., of Fairhaven, Vt., to Danied Durick and Patrick Keenan. Michael Keenan expects to open a slate mill formerly operated by Bolger Bros., at Hydeville. The former company has bought the Hazard quarry on Scotch Hill, for $5,000.

John H. Martin and G. A. Martin, of Boston, Mass., are progressing satisfactorily in the development of their slate quarries at Granville, N. Y., opened in September. The most modern machinery has been installed. They are producing purple roofing slate.

Efforts were made by incendiaries to burn the large three-story slate factory of Clark C. Weiss, at Bangor, Pa. The attempt was unsuccessful.

The Penn Bangor Slate Company, of Wind Gap, Pa., has increased its capital stock from $18,000 to $25,000.

The East Bangor Consolidated Slate Company has chosen the following officers: S. C. Smith, of Phillipsburg, president; J. P. Wood, of Philadelphia, vice-president; William Bray, of East Bangor, superintendent and treasurer, and J. N. Hoffman, secretary.

The Wind Gap Slate Company is putting in a new 125 horse-power boiler.

The Bittner Slate Company, of Slatedale, Pa., will open several new quarries.

The American Slate Company has elected the following officers: President, W. J. Turner; vice-president, R. H. Rushton; treasurer, W. W. Catchings; secretary, John F. Hoffmeister, all of Philadelphia; general manager, Cotton Amy, of East Bangor; assistant manager, Charles S. Ford, of East Bangor. Business for the past year was reported as unusually good, and a dividend of 2½ per cent., was declared.

Gen. W. H. Hughes has leased a por-

tion of the Whiting farm at Granville, N. Y., and will open a new quarry. Two hundred additional men will be employed by Gen. Hughes.

R. C. Penney, of Bangor, Me., has been appointed manager of the slate quarry at North Blanchard, Me., recently purchased by Boston and Bangor men. It is near the State of Maine quarry, and will be extensively operated in the spring.

It is said that several new quarries will be opened in the Granville district in the spring.

J. C. Stottlemyer and J. W. Hess have discovered a deposit of slate near Waynesboro, Pa., and will open up quarries.

John O'Brien has reopened one of the slate quarries on Penrhyn Hill, Middle Granville, N. Y.

The Bangor Slate Company has been incorporated at Trenton, N. J., with a capital stock of $20,000.

Griffin Bros. have resumed operations in their school slate factory at Flicksville, Pa., the lease of the Hyatt School Slate Company on the plant having expired.

The Hyatt School Slate Company, whose factory at Bangor was burned recently, has leased a factory at Slatington and begun operations.

A syndicate of Cleveland capitalists has purchased the lease of the West Albion slate quarry, near Pen Argyl. It is said that a company will be formed with a capital of $125,000 to operate the property on an extensive scale. Richard F. Howell, of East Bangor, has been engaged as superintendent.

The Pennsylvania court has dismissed the application of the Bangor and Portland Railroad Company, controlled by the Delaware, Lackawanna and Western Railroad Company, for an injunction against the American Bangor Slate Company, the Lehigh and New England Railroad Company and the Genuine Bangor Slate Company. The American Bangor Slate Company made an agreement with the former management of the Bangor and Portland Railroad, in return for an advance of $15,000, that all its slate would be shipped over that road. When the slate company began shipping over the Lehigh and New England road the Bangor and Portland people brought suit, with the intention of holding the American Bangor Company to the agreement. The decision is of far-reaching importance, as many other slate shippers in the Pen Argyl region have a similar agreement.

Restoration of a Famous German Church.

The Saxon city of Meissen is believed to date from the beginning of the tenth century, when a bishopric was founded by Otho I. The cathedral has been long accepted as an excellent example of German Gothic. The open work of the spire was at one time much admired. The original building was almost annihilated at the beginning of the thirteenth century, and the existing cathedral was commenced on the site about 1372. The works lasted about a century. In 1547 two of the towers were destroyed and no effort was made to restore them. The condition of the building caused much dissatisfaction. A society was formed to raise funds for completing the building, and over 40,000l. have been collected. The question next arose what plans were to be followed. A competition was arranged, and during the past five years there has been much discussion about the design that was best suited. Herr Schäffer, of Karlsruhe, who was entrusted with the restoration of Heidelberg Castle, prepared a design in which two towers were shown. Herr Linnemann, of Frankfort, introduced three towers in his design, and it was by many considered the more picturesque. In the most generous and self-sacrificing manner he gave preference to the design of his rival, and it has been decided by the society that Herr Schäffer is to carry out the restoration.

Canada's Increased Mineral Production.

Recently published statistics of the mineral production of Canada show an increase of 67 per cent. since 1890, the total being now $6,285,000, as compared with $3,761,000 in 1890. A large item in the increase is Portland cement, the manufacture of which is increasing at a very rapid rate. Canada now manufactures 283,000 barrels per year, or about 50 per cent. of the quantity consumed.

A Legation Building for Corea.

Unless Congress heeds the appeal of Secretary Hay for an appropriation of $40,000 for a Legation building at Seoul, Corea, this Government will be compelled to appoint a new Minister to that country. M. Allen, who represents us there, writes that the ceilings in the Legation building are only six feet from the floor and that he himself is six feet two inches. When he wears his silk hat out of doors it reaches to the eaves of the building.

Limes and Cements

Hewitt Boice, of Kingston, N. Y., has been elected president of the Oklahoma Cement & Plaster Co.

It is reported that the Southern States Portland Co. will establish a plant at Rockmart, Ga.

Work has been begun on the construction of the new Portland cement plant at Florence, Colo.

The plaster mills of the Alabastine Co., at Grand Rapids, Mich., which burned down in August last, have been rebuilt, equipped with modern machinery, and have started operations again.

Daniel Divir, of Deerfield, has purchased 400 acres of marl land, near Britton, Michigan, and will erect a cement factory in the spring.

The plant of the Empire Portland Cement Company, at Warner, N. Y., has been burned down, with a loss of $125,000. John D. Archbold, of New York, is one of the leading stockholders.

Preliminary surveys for the new plant of the Southern States Portland Cement Co., at Rockmart, Georgia, are being made. W. A. Craig will be the general manager.

It has been estimated that the loss by fire of the Empire Portland Cement Company's plant at Warners, New York, was $60,000. The insurance was $36,000.

The Colonial Construction Co., of Syracuse, has purchased 1,000 acres of land near Hudson, New York, and will erect a 2,000-barrel cement plant.

The Chickamauga Cement Co., of Rossville, Georgia, has secured a contract for $15,000 barrels of cement for the Weaver Dam Co., to be used in the construction of a dam in Asheville, N. C.

The Hecla Cement Co. has unusual facilities for cheap production at its plant at Bay City, Michigan. The company has a large deposit of coal which it will use for fuel, and the exhaust steam from the cement factory will be carried to its salt plant adjoining to boil salt with. The cement factory will cost $400,000, and will employ 200 men.

The Clare Portland Cement Co., incorporated under the New Jersey laws for $1,000,000 a year ago, expects to have a 1,000 barrel plant in operation by Oct. 1, on its large tract of clay and marl land, five miles north of Clare, Michigan.

It is reported that $500,000 worth of stock has been sold by the company which expects to erect a cement plant at Bedford, Indiana.

The American Cement Co. has erected a large new factory at Egypt, and the Lehigh Portland Cement Co. is also putting up a new mill near Ormrod, Pa.

The Marksboro Portland Cement Co., which has erected an 800-barrel plant at White Pond, Marksboro, New Jersey, has elected the following officers: President, H. V. H. Snyder; vice-president, Philip Scanlon, both of New Jersey; treasurer, John Brooks, of Boston; general manager, C. J. Curtin.

The Millen & Co. Cement Works closed down their plant at Wayland, New York, on Jan. 1, for an indefinite period.

The Alpena Portland Cement Co. has closed down its factory and is building an addition to the plant.

The Standard Portland Cement Co. has been incorporated in San Francisco, with a capital stock of $2,000,000, to erect a cement plant near Napa. Incorporators are: William J. Dingee, F. W. and W. G. Henshaw, E. J. McCutcheon, and Frank C. Havens.

The Glens Falls Portland Cement Co. has elected the following officers: Captain W. W. Maclay, president; Byron Lapham, vice-president; Arthur W. Sherman, treasurer; John E. Parry, secretary. The business for the past year was reported very satisfactory, and the outlook for the coming year is thought to be unusually good.

E. J. Huff, of Jacksonburg, near Blairstown, New Jersey, has discovered a deposit of cement rock on his property and it is believed that a cement plant will be erected.

The Marquette Manufacturing Co., of La Salle, Illinois, has been organized, with a capital stock of $150,000. Directors: N. W. Duncan, James H. Eckels, Michael F. Mahoney, Frank P. O'Connor and F. G. Dickinson.

It is reported that the Capital Portland Cement Co. has secured options on 600 acres of cement land, near Stewartsville, New Jersey, and will begin the erection of the plant as soon as the weather permits.

The New York Gypsum Co., of Syracuse, has been incorporated, with a capital stock of $100,000, to manufacture plaster. The directors are: Hamlin J. French, of New

York; Mansfield J. French, Sr., M. J. French, Jr., E. L. French, and A. W. French, of Syracuse.

The Iroquois Portland Cement Co. has completed its plant at Caledonia, New York, and will at once put it in operation. The officers of the company are: H. E. Hackenberg, president; C. F. Richmond, vice-president and treasurer; H. J. Davies, secretary, all of Cleveland. The general manager is W. V. Hamilton and the superintendent is M. J. Hollinger. The plant was constructed after plans by the Wellman & Seaver Engineering Co., of Cleveland.

The Lehigh Portland Cement Co. has increased its capital stock from $1,250,000 to $2,000,000.

The Wolverine Cement Company, of Coldwater, Mich., has been incorporated with a capital stock of $1,000,000. The new company is organized for the purpose of purchasing all the property, business and assets of the Michigan Portland Cement Co., which has been in the hands of a receiver. The officers are: President, D. C. Rexford; Vice-President, C. C. Johnson; Secretary and Treasurer, E. R. Root; General Manager, L. M. Wing.

J. F. Milhouse has discovered an immense bed of cement rock near Selma, Ala., and it is probable that a company will be formed to erect a plant.

Almon Bird, a well-known manufacturer of lime, of Rockland, Me., is dead at the age of 77 years.

The New York Lime Company, of Carthage, N. Y., has been incorporated with a capital stock of $25,000, to manufacture lime. The quarries and kilns are near Natural Bridge. John G. Jones is president, and Peter Yousey treasurer and general manager.

The Urschel Lime Company, of Sugar Ridge, Wood County, O., has been incorporated, with a capital stock of $36,000.

J. W. LeGore, whose extensive lime manufacturing plant north of Woodsboro, Md., has grown into a village bearing his name, will make extensive improvements this summer. A dam will be built to furnish electric power to operate the entire plant.

The Sandusky, O., Portland Cement Company has increased its capital stock from $100,000 to $300,000.

The Cayuga Lake Cement Company is considering the project of enlarging its plant near Ithaca, N. Y.

The plant of the Hudson, N. Y., Iron Works is being torn down to make room for the new cement factory to be erected there. The new company has purchased the quarries of Shute & Rightmyer, in Greenport.

Work is progressing rapidly on the 1,000-barrel Portland cement plant being erected near Florence, Colorado. The company has just purchased two large tracts of land containing lime rock.

Wrecking a Costly Mansion with Dynamite.

There has just been torn down a famous mansion about half a mile from Silverton in Devonshire, England—a house that attracted a great deal of attention as an interesting monument of the folly of a wealthy man. This was Egremont House, erected by the Earl of Egremont, about sixty years ago, in Silverton Park, near Exeter. Lord Egremont, who had a picturesque career in the middle of the last century, determined that he would erect a mansion which should be an example to the world of what his genius and riches could produce in the way of beauty and luxury. He was his own architect and he was profuse in the expenditure of money. He occupied the building only four years and did not live to see it completed. There were no less than 150 rooms and these contained 200 massive and richly carved mantelpieces. An elaborate bath was carved out of a solid block of marble. The door knobs of the principal rooms were fashioned out of amber. These gave an indication of the prodigal manner in which money was spent on the structure. It is said that the building cost more than a million and a quarter dollars. Lord Egremont's successors did not care to complete the mansion and for more than forty years it has stood unoccupied in the unfinished state in which the noble architect left it. Recently Egremont House was sold to Messrs. Atkins & Taylor, of Exeter, who have been demolishing it, in order to sell the building material that it contains. Some of the large marble mantelpieces sold for as much as $250 each. In order to save time in the wrecking of the building, Messrs. Atkins and Taylor recently blew up the whole of the front of the house by dynamite. Three charges were exploded and the experiment was successful, nearly the whole front being brought down. The house was built in the Grecian style and was notable as containing among its treasures a portrait of Sir Joshua Reynolds, which the artist painted for his native town of Plympton. It was sold by the corporation to the fifth Earl of Egremont for $750.

Contracts and Building

Government Work.

Butte, Mont.—The appropriation for the Federal Building here will be increased from $250,000 to $400,000.

Indianapolis, Ind.—Bids will be received at the office of the supervising architect, Washington, until March 17, for the court house and post office building here.

Knoxville, Tenn.—The new post office building for this city will cost about $125,000.

New Iberia, La.—Bids will be received by the supervising architect, Washington, until March 18, for the erection of a post office here.

New Orleans, La.—Bids will be received until March 15 for a brick and steel building costing $46,000 at the Naval Station. Address Bureau of Yards and Docks, Washington, D. C.

Plainesville, Ohio.—A site is being sought for the erection of a post office here.

Toledo, Ohio.—A new post office will probably be located at Madison and Huron streets.

State, County and City Buildings, Hospitals, etc.

Albia, Ia.—Plans for a new court house to cost about $75,000 are being prepared by O. O. Smith, of Des Moines.

Anoka, Minn.—A new wing and several buildings will be erected at the State Insane Asylum at a total cost of $35,000 to $40,000.

Cincinnati, Ohio.—A city hospital nine stories high and costing $1,000,000, will be erected, together with cottages for contagious diseases.

Des Moines, Ia.—Polk County will erect a court house after plans by Proudfoot & Bird.

Hawkinsville, Ga.—The Pulaski County court house here will be two stories high of brick and stone.

Kalamazoo, Mich.—The Kalamazoo Hospital Association will erect a brick and stone hospital building in the spring.

Linn Creek, Mo.—Camden County will hold a special election to vote on issuing $40,000 in bonds for a court house and jail.

Montgomery, Ala.—The Sisters of Charity will erect a $50,000 hospital.

Newton, Texas.—A three story court house will be erected after plans by F. S. Glover, Houston.

Philadelphia, Pa.—Plans are invited from architects everywhere for the $50,000 McKinley memorial to be erected here. Designs are to be submitted to L. W. Miller, secretary, 320 North Broad street, between September 15 and October 1 next.

St. Joseph, Mich.—Plans are being prepared for a $25,000 city hall.

Sibley, Ia.—The court house and jail to cost $50,000 will be erected here. Plans by Kinney & Detweiler, of Austin, Minn.

Sycamore, Ill.—DeKalb County has $70,000 on hand for the erection of a new court house.

Washington, Ga.—Wilkes County will receive bids until April 15 for a court house costing about $35,000.

Wichita, Kansas.—The county will vote on a proposition to erect a $50,000 court house.

Youngstown, Ohio.—At the spring election the citizens will vote on the erection of a city hall costing $150,000.

Churches, Convents and Synagogues.

Allegheny, Pa.—The German Lutheran Society will erect a $40,000 church after plans by W. E. Worley & Company, of Pittsburg.

Baltimore, Md.—St. Stanislaus Bohemian Catholic congregation will erect a new church. Rev. Thomas Morys, pastor.

Butler, Pa.—The Second Presbyterian Society will erect a $25,000 church.

Calumet, Mich.—The Roman Catholic congregation will build a stone and brick church costing $25,000, after plans by Carl E. Nystrom.

Carrollton, Ky.—St. John's Roman Catholic congregation will build a stone and brick church costing $20,000, after plans by Leon Coquard.

Chillicothe, Ohio.—Grace Episcopal Society will erect a $55,000 church.

Detroit, Mich.—The Preston Methodist Society will erect a $25,000 brick and stone church on Lambert Place after plans by Joseph E. Mills.

Escanaba, Mich.—St. Patrick's Catholic Society will erect a $50,000 church after plans by Shick & Roth.

Glenville, Ohio.—St. Aloysius congrega-

tion will erect a $35,000 church and school after plans by William P. Ginther, of Akron.

Indianapolis, Ind.—The First Presbyterian congregation will erect an $80,000 church, after plans by Crapsey & Lamm, of Cincinnati.

Manchester, Va.—The Second Baptist Society will erect a $25,000 church at Foushee and Franklin streets.

Newport News, Va.—The First Baptist congregation will build a stone church costing between $30,000 and $40,000.

Overbrook, Pa.—The Presbyterian church here will build a stone Sunday school, and will make additions to the church, including a stone tower, stone porte cochere, stone porch and a pastor's study. Architects W. L. and W. F. Price, 720 Walnut street, Philadelphia, Pa.

Red Oak, Ia.—The Methodist Society will erect a $25,000 church.

Seattle, Wash.—Rt. Rev. Edward O'Dea has purchased a site for a new cathedral at a cost of $35,000. It is hoped to erect a cathedral to cost at least $250,000.

Washington, D. C.—St. Mary's Church will build an orphanage at Fifth and Washington streets, Northwest. It will be of Gothic design of red pressed brick with limestone trimmings. Plans by Julius Wenig.

Schools, Colleges and Libraries.

Anaconda, Mont.—A high school to cost $50,000 is being discussed.

Ann Arbor, Mich.—The University of Michigan will erect a $100,000 engineering building, after plans by Mason & Kahn, of Detroit.

Ann Arbor, Mich.—A $40,000 school house will be erected here.

Bolivar, N. Y.—A school house to cost $35,000 will be erected here.

Butte, Ind.—A school building to cost $35,000 will be erected here.

Chicago, Ill.—Plans have been prepared for an English High and Manual Training School to cost $250,000.

Colorado City, Colo.—A $45,000 school building will be erected after plans by B. T. Barber.

Corsicana, Texas.—A high school building to cost $25,000 will be erected.

Cripple Creek, Colo.—The Sisters of Mercy will erect a $50,000 school.

Fort Wayne, Ind.—The Concordia Lutheran College hopes to erect a new main building costing $100,000.

Gainesville, Ga.—A new school building is to be erected at a cost of $40,000.

Goshen, Ind.—A $50,000 high school will be built here.

Grand Rapids, Wis.—A $40,000 high school will be erected after plans by Chandler & Park, of Racine.

Homestead, Pa.—The school house on Walnut street, recently burned, will be replaced by a new $25,000 building.

Meridian, Miss.—Plans are wanted for a modern school building to cost not less than $25,000.

Newbury, Mich.—The town is considering the erection of a school to cost from $25,000 to $30,000.

Philadelphia, Pa.—The University of Pennsylvania is raising funds for the erection of gymnasium and other buildings to cost over $500,000.

Rochester, N. Y.—A new school house will be erected in Number Seven district.

St. Cloud, Minn.—An addition to the main building of the State Normal school here will be built at a cost of about $40,000.

St. Louis, Mo.—A $200,000 high school building will be erected in North St. Louis and a grammar school, costing $120,000, at Allen and McNair avenues.

Saratoga Springs, N. Y.—The legislature has authorized the village to raise $30,000 for a school house.

Springfield, Ill.—A movement is on foot for the erection of a State library here, to cost $500,000.

Westchester, Pa.—The new library building for the State Normal school will be of limestone and serpentine green stone. It will be two stories in height and will cost $45,000. Plans by Baker & Dallett, Crozier Building, Philadelphia.

Windsor, Canada.—John Scott & Company, of Detroit, Mich., have been chosen supervising architects for the new Carnegie library, to be erected here.

Business Buildings, Theaters, Hotels, Society Halls, Etc.

Baltimore, Md.—The Washington Litholitic Stone Company expects to build a large plant here.

Beaumont, Texas.—The Penman Steel and Iron Works, recently incorporated, will erect a $1,000,000 plant here for the manufacture of steel tanks and tank cars for the storage of oil.

Chicago, Ill.—A. Montgomery Ward proposes to erect two sixteen story buildings to cost not less than $2,250,000 at Michigan avenue and Washington street.

Detroit, Mich.—Hannan & Tuffts will erect a ten story apartment house costing $250,000, on Jefferson street, after plans by M. L. Smith & Son.

East Liverpool, Ohio.—W. G. Clark, A. G. C. Roades, M. I. Jacobs and Herbert Carlton have formed the Fourbell Clay Manufacturing Company, and will erect a $60,000 plant.

Fond du Lac, Wis.—The Commercial Bank will erect a modern two story bank building of Ashland brownstone.

Frederick, Md.—R. Rosemour & Sons will build a department store on Market street of brick and brownstone, costing $25,000. Plans by Louis Levi, of Baltimore.

Indianapolis, Ind.—The Indianapolis Gas Company will erect a gas plant costing $350,000.

Iowa City, Iowa.—The Masons propose to erect a temple to cost from $40,000 to $50,000.

Jacksonville, Fla.—The contract for the stone work on the Israel Putnam building here has been awarded to the Ramsey, Brisben Stone Company, of Atlanta Ga.

Memphis, Tenn.—Napoleon Hill will erect a five story office building of stone and brick costing $85,000 at Third and Madison streets. Plans by Chighizola & Hanker.

Monticello, Ia.—The Monticello State Bank will erect a bank and office building of pressed brick and Bedford stone, after plans by Netcott & Donnan, of Independence.

Nashville, Tenn.—The Nashville Trust Company has accepted the plans of B. J. Hodge for a new bank building on North College street. It will have a stone front with granite columns and marble floors and wainscoting.

North Augusta, S. C.—The North Augusta Hotel Company has been chartered with a capital of $300,000, to erect a hotel here.

Philadelphia, Pa.—A fifteen story office building of stone is to be erected on the southeast corner of Sixteenth and Chestnut streets in the spring.

Philadelphia, Pa.—Architect Emil Hartman, of 514 Walnut street, is preparing plans for two houses on North Thirteenth street to cost $55,000 each. The first and second stories will be of stone.

Pittsburg, Pa.—Hartje Brothers will build a ten story $400,000 hotel at Liberty and Tenth avenues.

Pittsburg, Pa.—One of the finest hotels in the country will be built by Henry C. Frick at Sixth avenue and Grant street, after plans by D. H. Burnham & Company. The total cost of the building and site is expected to reach $5,000,000.

Richmond, Va.—The Mutual Assurance Association of Virginia are planning the erection of a sky-scraper to cost nearly a million dollars at Ninth and Main streets. It will be from 10 to 18 stories in height.

Rolla, N. D.—A State bank will be organized here and a building erected for it.

San Antonio, Texas.—The Alamo National Bank will build a five story brick and stone banking building on Commerce and Presa streets.

Toledo, Ohio.—The Masonic Temple to cost $100,000, will be erected at Adams and Michigan streets.

Trenton, N. J.—The Air Funnel Equipment Company will erect a manufacturing plant here.

Villanova, Pa.—Anthony J. Drexel is to build an elaborate country house here, 160 x 100 feet, in the style of the English Renaissance. It will be of Indiana limestone with red tile roof and will cost $150,000, without the interior decoration. The plans are by Horace Trumbauer, of Philadelphia.

Walkburg, W. Va.—G. B. Vandergrift will erect a banking and office building at Eighth and Main streets, of brick with brownstone front.

Washington, D. C.—A club house, costing $150,000, in the French Renaissance style, will be erected at Vermont avenue and K street, N. W. Plans by Marsh & Peters.

Washington, D. C.—General Anson Mills will erect a nine story office building costing $500,000, at Pennsylvania avenue and Seventeenth and G streets, N. W. The first two stories will be of granite and the remainder of buff brick.

Waukesha, Wis.—The Waukesha Sheet Steel Company will double the capacity of its plant here at a cost of about $200,000.

Wilmington, Del.—The Delaware Forge and Steel Company will erect a large plant here.

Wyandotte, Mich.—The Michigan Alkali Company will enlarge its plant at a cost of $1,000,000.

Bridges, Depots and Railroad Work.

Allegheny, Pa.—The Pennsylvania Railroad is about ready to let the contract for the elevation of its tracks here. The work will require a number of bridges.

Altoona, Pa.—The Pennsylvania Railroad will enlarge its shops and build a wheel foundry.

Attica, Ind.—Warren County will build a stone and steel bridge 450 feet long over Little Pine Creek in Warren Township.

Auburn, N. Y.—The New York Central will build a new passenger station here.

Augusta, Ga.—Bids are being received for a new Union station here to cost about $130,000.

Austin, Texas.—The Houston and Texas Central will build a $20,000 passenger station here.

Bowling Green, Ky.—The Louisville & Nashville will erect a $35,000 passenger station here.

Bristol, Va.—The Southern Railroad and the Norfolk and Western are expected to build a union station here.

Charlotte, Mich.—The Michigan Central Railroad will build an $18,000 passenger depot here, of Bedford limestone and Roman pressed brick. Plans by Spier & Rohns.

Charlottetown, P. E. I.—A new railroad station will be erected here at the foot of Prince street.

Chester, Pa.—The Pennsylvania Railroad has had plans drawn for a new station here.

Dallas, Texas.—The Dallas Terminal Railroad will make extensive improvements here at a cost of $500,000.

Danville, Ill.—The Big Four will build a stone arch bridge over the North Branch here.

Doylestown, Pa.—Bucks County will build a stone arch bridge in Milford Township.

Grand Rapids, Mich.—The Grand Rapids, Kalamazoo and South Haven Traction Company will build a station near Allegan and dam the Kalamazoo River.

Greenwich, Conn.—The town is considering the matter of building a bridge over Mianus River, at Mianus. Estimates for a steel bridge are $14,000, and for a stone bridge from $21,000 to $23,000.

Hartford City, Ind.—The Hartford City Interurban Line, will build a power house costing $125,000 after plans by Roberts & Company, of Cleveland.

Keystone, S. D.—The Burlington Railroad will erect a new passenger station here.

Lebanon, Ind.—Boone County will build a number of stone arches the coming season. David H. Shockley, auditor.

Livingston, Mont.—The Northern Pacific is expected to erect a passenger station here to cost $75,000.

Marshalltown, Ia.—The Chicago Great Western will build a $40,000 depot here in the spring.

Nashville, Tenn.—The Nashville Railroad will build an arcade and transfer station here costing $100,000.

Montreal, Que.—The Canadian Pacific Railroad will concentrate its engine and car shops here and build the largest plant of its kind in America.

Paris, Tenn.—The Louisville and Nashville will build a $75,000 depot here.

Pittsburg, Pa.—The Pittsburg and Lake Erie will replace all small bridges on the road between Pittsburg and Youngstown with stone or concrete structure. The stone arch culverts of 50 to 70 feet span will be used in some instances to replace a series of steel spans over large openings.

Quakertown, Pa.—The Reading Railroad has plans for a new stone passenger station here.

Richmond, Va.—The Richmond Locomotive Works will erect a new building at a cost of about $100,000.

Rutland, Vt.—The Rutland and Bennington Railroad will build a new station at Rutland, and will improve a number of the stations on its line.

Springfield, Ohio.—The Big Four will build new passenger and freight stations here costing altogether about $200,000.

Troy, N. Y.—A. Pasquini, of Albany, has been awarded the contract for the new station for the New York Central Railroad here.

Tuscaloosa, Ala.—A new depot is to be erected here by the Mobile and West Alabama Railroad.

Vancouver, Wash.—The Northern Pacific is preparing plans for a $2,000,000 steel and stone bridge over the Columbia River here.

Washington, D. C.—It is expected that the Pennsylvania Railroad and the Baltimore and Ohio will erect a station here of white marble to harmonize with the government buildings.

Marbles and Sapphires in Indo-China.

A mining engineer, M. Marc Bell, who has recently traveled through Indo-China investigating the mineral wealth of the country, has reported to the Society of Commercial Geography, of Paris, the result of his observations. M. Bel says the economic conditions are favorable to the development of the mining industry, although the present mining law has not done much to help enterprises in this direction. He found marble and china clay, and some of the deposits are worked in a limited way at present. Sapphires have been found on the banks of the Meekong, and the beds have been worked with success.

Book Reviews.

BULLETINS ON ALASKA. U. S. GEOLOGICAL SURVEY, Charles D. Walcott, Director. Washington: Government Printing Office.

Two timely bulletins on Alaska have just been issued by the Geological Survey. One of these is "The Geology and Mineral Resources of a Portion of the Copper River District," by Frank Charles Schrader and Arthur Coe Spencer. It is based upon field work done in the summer and fall of 1900. A map was drawn of a large area, including the region in which the copper ores were found and the general drainage basin of Chitina River. It was possible, of course, to give close observation to the geological features of a small portion of the territory only, but this serves to reveal the general geological conditions of the district. The authors think that the copper indications are very favorable throughout the district. Gold has been found in some parts, but there are no proofs that it exists in any considerable quantities. There are also reports of coal and oil, but scanty information only is at hand at present. The second bulletin is "Reconnaissances in the Cape Nome and Norton Bay Regions, Alaska, in 1900," by Alfred A. Brooks, George B. Richardson, Arthur J. Collier and Walter C. Mendenhall. The authors of the report frankly admit that it is only the hasty survey of a preliminary reconnaissance in the gold fields. They wisely decided that an early publication of the results of their investigations was the most important consideration. The report will meet a popular demand and with its many excellent maps and its careful recording of existing conditions in the gold camps it will prove extremely useful to the prospectors.

THE EIGHTEENTH ANNUAL REPORT OF THE BUREAU OF AMERICAN ETHNOLOGY, 1896-1897. Part II. J. W. Powell, Director. Washington: Government Printing Office.

The second part of the eighteenth report of this bureau is devoted to Indian land cessions in the United States. The introduction, which occupies a trifle more than 100 pages, is written by Cyrus Thomas and discusses "Right to Soil Dependent on Discovery;" the Spanish, French and English policy toward the Indians, and the policy of the thirteen Colonies and of the United States toward the red men. This is followed by schedules of treaties and acts of Congress, authorizing allotments of land in severalty and of land cessions. These schedules are compiled by Charles C. Royce and are accompanied by sixty-seven colored maps showing all of the cessions of Indian lands. This volume represents an enormous amount of careful work. It presents a mass of legal evidence and material for history that cannot be had in any other form. It would be difficult to overestimate its importance.

TEXAS PETROLEUM, by William Battle Phillips, Ph.D. Austin: University of Texas.

This is the first of the University of Texas Mineral Survey Bulletins, and is written by the director of the Survey. The Survey was organized on May 4, 1901, and the preparation of the above report was at once begun. The promptness with which the Survey has taken up the important subject of the petroleum production of the State and the thoroughness with which it is covered promises well for the future work of the Survey. It is announced that bulletins are in preparation for early publication devoted to the metallic resources of the State and also to the building stones, clay, asphalt, cement and other non-metallic mineral resources. Under Prof. E. T. Dumble considerable progress was made in the investigation of the geological features of the State, and what is needed now most imperatively is a consideration of economic conditions such as proposed in the above bulletins.

The Granite Pillars of St. John's Cathedral.

F. S. Walls, of Vinalhaven, said to a reporter of an Augusta newspaper: "Two complete pillars for the church of St. John the Divine, in New York, have been completed by the Bodwell Granite Company. Each pillar is made in two parts, and when joined together will measure 58 feet. It was expected that these pillars could be quarried and finished in one piece. A lathe was especially made for them, which cost $30,000, but it was found impossible to work the full length pillar. So they are now being made in two pieces. Quarryman Edward Russell still contends that the pillars can be quarried and finished on our lathe. There are six more pillars to be finished.

"The experiment of finishing such an immense block of granite in one piece was not a success, although practical men say it can be done. The first stone tried was so long that it broke in two pieces while being run through the big lathe. So we have been getting out the pillars from 28 to 30 feet long."

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VOLUME XXIV. **NUMBER 2.**

STONE.

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ST. MATTHEW. ST. MARK.

TRINITY CHURCH STATUES.

STONE

VOL. XXIV. NUMBER 2.

THE MEDINA SANDSTONE COMBINATION.

FOR twenty years past efforts have been made to bring about a combination of the Medina Sandstone interests of Orleans County, N. Y. Options on the various quarries have been given and these have been renewed from time to time as they expired before the deal could be consummated. Last fall the scheme was pushed vigorously, and it looked as if it might be carried through then. There were certain hitches, however, and the matter again dropped out of public sight, and the options expired. The efforts, however, have been crowned finally with success, and there has been incorporated the Medina Quarry Co., of Albion, Orleans County, with a capital stock of $2,000,000, to conduct a stone quarry business, to maintain railroad, water and other transportation lines, and to erect and operate mills and factories. The directors are: Elverton R. Chapman, W. E. Skerritt, Edmund Seymour, L. H. Holt, L. D. Baldwin and Bird S. Coler, of New York City; W. S. Harvey, of Philadelphia; James S. Roberts, of Buffalo; Gilbert Brady and A. S. Squires, of Rochester; William O'Brien, of Holly; Michael Slack, of Medina; E. F. Fancher, of Albion, and M. H. Phillips, of Murray. There are about 50 quarries, large and small, operating in the Medina sandstone district. All but three or four of these are interested in the consolidation. It is understood that the quarry owners will receive a fair allotment of common and preferred stock, and will also be given payment in cash.

There are only a few instances where the stone trade lends itself to the formation of combinations, and this is a marked example. Medina sandstone is found only in a narrow belt, extending over Orleans County. The stone is different from that of any other deposit. It is attractive in color and is extremely hard for a sandstone, ranking almost with granite in strength. It has been used with good effect for building and heavy masonry and has met with decided favor for paving and curbing. With the many small quarries that have been in operation, it has followed that there has been a keen competition among producers. In order to keep the quarries in operation, contracts have been taken at figures that precluded any idea of profit. Under wise, progressive management, this senseless competition will

be stopped, and full advantage will be taken of the excellent market that exists for this stone. With sufficient capital available, it will be possible to equip the quarries and mills with the most approved machinery, and thus largely decrease the cost of production. Among the leading spirits in bringing about this combination are Mr. Edward Fancher, an enterprising quarryman of Albion, and Honorable James A. Roberts, of Buffalo, formerly State Comptroller and member of the well-known DeGraff & Roberts Stone Co.

FOUR ARTISTIC CHURCH STATUES.

FEW examples of stone work have attracted more attention than the statues of the four Evangelists, recently placed in position in the niches on the north and south sides of the tower of Trinity Church, New York, which have been awaiting them for sixty years. Their location is in the midst of what is, perhaps, one of the busiest sections of the earth's surface. Within the shadow of the tower pass all day long countless throngs of hurrying men. Yet each of these has stopped to gaze upon the statues, and when the latter were slowly and laboriously hoisted into place, swathed in wrappings of burlaps and rope, the street was almost impassable from the crowds of curious onlookers. Until the statues were finally in place and the scaffolding removed, no idea of their effectiveness could be gained or of the addition they make to the architectural attractiveness of the church. The vacant niches in so prominent a place were always an eye-sore. The accompanying illustrations are the first that have been printed, giving an excellent idea of the artistic workmanship of the sculptures. It will be seen that the designer has wisely given them an architectural effect in keeping with their purpose. Mere prettiness would have been worse than incongruous. The strength, dignity and simplicity of all of them are remarkable, and yet each one has been given individual character. As was formerly explained in these columns, the statues are a gift to Trinity Church from Mr. and Mrs. William Fitzhugh Whitehouse, former members of the congregation, but now residents of London. They were executed by Messrs. Farmer & Brindley, 63 Westminster Bridge Road, London.

The statues are carved from blocks of Dumfries sandstone, or as it is more generally known in the trade, Corsehill Scotch red stone. The greatest care was used in the selection of the stone, and only the choicest blocks from the quarry were used. A sample from one of these blocks is now in this office, and has been declared by a number of stone men who have seen it to be the finest specimen of this variety of stone that has ever come under observation. The color is absolutely uniform and the texture is perfect. It is but natural that many unthinking people should express surprise and a little disappointment at the light color of the statues. The real color of the stone has not been seen as yet, nor will it be until the marks of the tooling have gradually worn away un-

ST. LUKE. ST. JOHN.

TRINITY CHURCH STATUES.

der the action of the weather. When the natural color has been reached they will thereafter continue to darken and mellow under climatic influences until they finally come into harmony with the remainder of the building. The real color of the stone can be seen in the first story of the Consolidated Exchange, but a few steps away, where the same variety of stone is used. It must be remembered that the stone of the body of the church has been darkened by sixty years of weathering. This fact of the coloring is not meant in any sense as a criticism, but simply as an answer to the comments of a few people who seem to think it would have been possible to make the statues of the exact tint of the body of the church. Even if this could have been done it would have been undesirable, as contrast is needed in this style of work. In the course of a year or two, when the newness of the work has been softened down, the full effect of the statues will be seen.

As we have heretofore recorded, the church is built from brownstone quarried at Little Falls, N. J. An old stone man whose memory goes back to the days when the church was built, declares that th choicest stone was taken from no less than six quarries, all grouped within a short distance of each other along the canal just below the falls which gives the name to the village. These quarries were long ago abandoned. On the site an immense filter plant has been erected, necessitating a vast amount of rock cutting. Of recent years, when repairs on the church have been necessary, as it was impossible to obtain stone from the original quarries, use was made of the Belleville stone, from the quarries of the Passaic Quarries Company, a short distance below Little Falls and on the same strata of rock. This stone is slightly different in color, but is the same in texture. At the time the statues were placed in position a new carved finial was added to the canopy over one of the niches on the north side of the tower. This was cut from Belleville stone and, of course, it presents some contrast now. How closely the two stones harmonize, however, can be seen from the step of Belleville stone that has been placed in one of the south entrance porches. This was set several years ago and could scarcely be distinguished from the original structure.

THE QUARRYING OF HUGE FLAGSTONES.

SOME months ago there was printed in these columns an account of the cut stone work on the immense building being erected by the Prudential Insurance Company in Newark, N. J. This building is one of the largest and most costly stone business structures erected in this country. It covers a large tract of ground and rises many stories in height. The cut stone work is elaborate in design and excellent in execution. In no way has money been stinted in the erection of this building.

A Newark writer gives an account of the immense flagstones which have been placed in front of the building on Broad street. Owing to the severity

of the weather and difficulty of transportation the work of setting the stones proceeded slowly. The flags were quarried at Pond Eddy, Sullivan County, N. Y., close to the border line of Pennsylvania. The quarry is situated about 1,500 feet above sea level at a point in the mountains nearly two miles back from the Erie Railroad.

The work of quarrying was begun in January, 1901; two months were occupied in removing what is known as the top, about twenty feet in depth, and it was not until June that the first stone was extracted, so that six months were occupied in its production, and the quarrying has continued until the present day.

The largest of these stones when taken from the quarry weighed about twenty-six tons and when dressed weighed about twenty tons and measured twelve by twenty-two feet. This is the third largest stone ever mined and brought to market, and as a collection the thirty-five pieces, which cover a

A HUGE FLAGSTONE READY FOR SHIPMENT
Size: 20 x 24 Feet, 9 Inches Thick.

frontage of about three hundred and seventy-five feet, exceeds any in this country, and probably any in the world.

From the quarries the stones were drawn to the station on two large skid wagons which were built especially to carry from twelve to fifteen tons each. The wagons were hooked tandem and the stone so blocked as to rest equally on each. In most instances they were drawn from the mines by eight or ten horses, and as a great part of the distance is down the mountainside it was necessary to chain the wheels so that they would slide in-

stead of turning, and also to place a tackle out in the rear to hold the immense weight from descending too rapidly. This was done by hooking it to trees along the road or placing in the road what is known as a "snubbing post."

At the railroad the stones were in most instances loaded directly from the wagons on to the cars. As the majority of the stones were considerably wider than the cars it was necessary to make a special arrangement with the railroad for their transportation. This arrangement consisted of transporting the stones only by daylight and by special express freights, which were so arranged that no trains were allowed to pass while working between the stations. In one instance, through an error of billing, some stones were taken to Bergen Junction, and it was thought that they could be sent over the Newark branch from that point, but on making the attempt the stones ran afoul of several telegraph poles and knocked them down. It was then found that the stones were too wide to pass beneath the Delaware, Lackawanna and Western Railroad, which crosses over the Erie at Bergen Junction, which necessitated the sending of the stone back to Ridgewood Junction and from thence to Newark. On their arrival in this city they were immediately taken to the yards to be dressed, and for their transportation from the railroad to the yards a special truck had to be built.

To dress the stones it was found necessary to have a special planer built, as there was not in this country a machine sufficiently wide to put them through.

Among the difficulties encountered in bringing the stones from the quarries to the railroad was the necessity of having to rebuild and strengthen all the bridges along the route, and in the latter part of November a heavy storm caused a freshet which washed away our roads and carried off three bridges, at which time there were yet five pieces of the large stones to be brought from the mountains. This caused a delay of about three weeks for the purpose of reconstructing the road and bridges.

The cost of the Broad street sidewalk, consisting of ten flags, was about $25,000. The largest of these, the corner flag, cost about $3,000, and each of the others averaged about $2,400 each. These flags, if they had to be purchased singly, would cost considerably more than this. The corner one would probably cost as much as $5,000, and the others $4,000 each.

The flags on Bank street, between Broad street and Library Court, twenty-five in number, averaged about $1,000 apiece.

While this is probably the largest single job of flagging ever undertaken, the record for single stone is headed by New York city. In front of Mrs. Cornelius Vanderbilt's house on Fifth avenue is a single flag measuring 25 x 15 feet, and one in front of William C. Whitney's house on the same avenue is 26 x 13 feet 6 inches. These stones were produced in Sullivan county on the line of the Delaware & Hudson Canal. The quarries no longer yield such large flags, and if they did it would be next to impossible to get them to New York owing to the abandonment of the canal.

A TYPICAL BLUESTONE QUARRY; GETTING OUT LARGE FLAGS.

There are also many large flags in the business section of New York. The largest of these are to be found in front of the American Exchange Bank building, at Broadway and Cedar street. These were quarried in Phœnicia, Ulster county, N. Y., and were brought out over the Ulster & Delaware Railroad. The largest of the stones is 15 x 14 feet 8 inches and weighs sixteen tons.

DECORATING THE ROYAL APARTMENTS.

THE taste that marked the early part of the Victorian era was very soon outgrown. It had a heavy German character that was not particularly suited to the temperament of the English. The decoration of Windsor Castle and of the other Royal residences in England furnished examples that found little admiration in the latter days. That they were retained during the long reign of Queen Victoria was but natural. That the new ruler should bring the decorations into accordance with the tastes of the times is equally natural. The renovation of the Royal apartments at Windsor Castle is now nearing completion. The work has been undertaken by Messrs. Waring, of London, and an interesting description of it is given in "The Architect and Contract Reporter" of that city. The writer says:

"As now treated, the rooms suggest a new note of refinement and delicacy of ornament which augurs well for the interior decorative art of the new century. It has not been an easy task to deal with a Gothic building already decorated in the early Victorian style. Messrs. Waring and their artists have grappled with the difficulties in a spirit of thoroughness, and with gratifying results. A brilliant effect has been obtained by employing large surfaces of cream-white as a background for the superb works of art in which these apartments abound. The rooms reserved for the princesses are marked by a homely comfort and a total absence of everything in the way of regal splendor. They exemplify the tastes of occupants whose wishes have suggested simple wall-coverings of exquisite design, comfortable nooks and corners made out of otherwise void spaces, a cosiness imparted to lofty rooms, and a distinct individuality indicated by the employment of deep white friezes.

In the King's bedroom, a splendidly-proportioned apartment, the color predominating is an Irish green; at least the heavily-woven carpet from the Sister Isle, which gives the keynote of the color scheme, is made by Irish labor, the silk panels and window draperies taking up the same color in a softer tone.

The King's sitting-room is the one in which the late Prince Consort passed his last hours, and during Queen Victoria's lifetime the bed in the alcove and every other article were left in exactly the same position as on that memorable morning in December, 1861. The whole of the interesting features which identify the room with the close of an illustrious career have been preserved with reverent care. The ceiling has been slightly reduced in height, an eighteenth-century raised moulding in flowers and fruits

of a simple form occupying the centre with a handsome console cornice. The whole is left a perfectly plain white. Below is a deep frieze or band of self-colored soft green. The room has a high wooden dado, with bevelled panels and pilasters, forming an excellent background for the favorite family portraits which adorn the walls. A striking effect is obtained by the manner in which the woodwork has been finished off. It is made of solid mahogany, and painted in an ivory white, quite remarkable in its finish. This effect is obtained by a process of rubbing down or felting between

A FAVORITE ROYAL RESIDENCE; BALMORAL CASTLE.

each successive coat, the gloss which is apparent being obtained not by any form of varnishing, but by painstaking labor. An agreeable sense of warmth is, however, secured by means of a brilliant red Oriental carpet and softer toned red silk curtains. The furniture, it is interesting to note, dates from the end of the eighteenth century, and is, therefore, just one hundred years old. The much-needed reparation of the coverings has been treated in such a way that it seems to enter completely into the decorative scheme.

Her Majesty's bedroom is panelled in a soft rose silk and the windows are hung with a pure white soft satin which hangs in ample folds and gives the necessary cool effect. The whole of the furniture is of the Empire period in design, and the bed draperies surmounted by the Imperial Crown make quite an imposing feature. The bathroom adjoining is panelled with a soft marble on one side and Sheraton wood on the other. The marble employed both in the King's and Queen's bathrooms is of Greek origin, from the quarries which have been reopened within the last year after having been lost sight of for over a thousand years.

By general opinion the palm must be awarded to the scheme executed in the royal boudoir. Old Louis XVI. furniture has been transferred from

another part of the Castle and covered in a soft-colored Beauvais tapestry, and the carpet, manufactured in France at the State factories, is remarkably tender in color, taking up the mother-of-pearl tints of old rose, green, blue, cream, etc. The broad, old-fashioned gilt moulding round the panels has been retained and the centre filled in by one of the most beautiful silks which could possibly be designed for this type of Marie Antoinette room. Strained on the walls it has the appearance of a delicate ivory with hand-painted medallions suspended from floral wreaths. Similar silk is utilized for the draperies and palmettes. The graceful folds of the curtains produce all the effect and lustre of rich silk, which is moreover helped by a velvet border of soft heliotrope. The old satinwood doors have been replaced by beautiful Spanish mahogany with bronze ornaments in keeping with the general character of the room, which is certainly one of the daintiest conceptions of a ladies' apartment that the artist could produce.

THE BUILDING STONES OF NOVA SCOTIA.

THE stone used for structural purposes in this province is either sandstone or granite. There are several varieties of the former, passing from a very light fawn to a purplish red. The granite used is of a standard gray color. As the sandstones and freestones fit for the quarryman's work occur chiefly in the Upper Coal measures and the Permocarboniferous, we find the principal quarries extending along the straits of Northumberland from Merigomish, in Pictou County, to the Joggins, in Cumberland County. The quarries are in most cases conveniently situated for either railway or water transport, and for effective quarry work.

Samples of these stones were forwarded to the Paris and Glasgow exhibitions, and the following notes from a paper on the Nova Scotia minerals for the Paris exhibitions, read before the Nova Scotia Institute, session 1899-1900, will serve to show their position and extent.

These notes refer to the quarries in the northern part of Cumberland County, which furnished samples of their products.

Quarries at River John.—No. 1. This is the only quarry at present working in this district. It is situated at River John and about a quarter of a mile from I. C. Railway, and is connected therewith by a good road.

It contains a reddish sandstone of fine grain, and has been opened for about 350 feet in length, exposing a face so far of about 14 feet. Stones are cut here up to about 33 cubic feet, though almost any size could be obtained with larger machinery. The seams are very regular in formation and lie nearly horizontal. Worked for nearly a year.

No. 2 adjoins the first quarry, and resembles it in general characteristics, though the stone is of a lighter color.

No. 3, about a quarter of a mile up the river from No. 1, was worked for six years intermittently. Many grindstones were cut in this quarry, which yields a firm gray sandstone.

Wallace Harbor.—The Wallace Gray Stone Co., Wallace Harbor, John

Stevenson, manager. This quarry is situated at Wallace, and a great part of the stone is shipped by water, though it is connected with the I. C. Railway by a good wagon road about two miles long.

Though the stone is carried to the wharf by horses, a tramway (gravity) could easily be operated, the quarry being situated on a hill. The distance is about a quarter of a mile. This quarry has been worked for a period of nearly thirty years off and on, and is still only partially developed. It produces an average of about 1,500 tons ("quarry") a year, of fine grained sandstone in two colors—"olive" and "bluish."

Blocks up to ten tons in weight and measuring fourteen feet are cut, and the greater part of the stone is shipped to the Boston and New York markets. The poorer stone is sold locally.

Wallace Harbor.—The G. P. Sherwood Co., T. C. Dobson, manager. This quarry adjoins the quarry of the Wallace Gray Stone Co., and the same remarks apply to it.

At Wallace Bridge the famous Battye Quarry is being operated by

MILL AND YARD OF JOHN KLINE, JR., AT HALIFAX, N. S.

George Battye. Stone has been taken from this quarry since the year 1809, and there is still much in sight. It is situated on the I. C. Railway and the Wallace River. Chief market New York and Eastern States cities. Blocks up to ten tons are cut. At present 25 feet of rock is shown in the face, with seams measuring from two to six feet in thickness. This is composed of a very uniform and beautiful sandstone, suitable for monuments as well as construction work.

On the River Philip, about five miles from Pugwash, is situated the quarry of McLeod & Embree. It produces a handsome red sandstone con-

tained in seams from two to seven feet, and shows altogether 20 feet in the face. Blocks cut to eight tons. Has been operated for upwards of 30 years, and usually ships to the States. This year all the stone quarried is being supplied to Toronto.

The Atlantic Stone Co., Limited, R. S. Hibbard, Manager.—The quarry of this company is situated on Cumberland Basin, 3½ miles from Joggins Station, on the Canada Coal Company's Railway, and 16 miles from I. C. Railway. The stone is shipped chiefly by water, in vessels up to about 300 tons. The market is mainly in the New England States, though the stones are occasionally sent much further west. 2,000 tons shipped per year. This quarry produces a very superior form of grindstone. Stones from half an inch to 14 inches thick, and up to seven feet in diameter are cut, though almost any size that could be handled is procurable.

At Lime Rock, West River, Pictou County, are sandstone quarries yielding good building stone. Samples are shown by Mr. J. H. Fraser. In the Merrigomish district the strata lying above the Productive measures yield grindstones and fair qualities of freestone.

Other localities are Pictou, and Glenfallock. On the Basin of Minas, Cornwallis, Johnston Brook, Horton, Falmouth, Kennetcook, Nine Mile River, and Old Barns, have yielded freestones in some cases of delicate shades and good texture. In Cape Breton sandstones from the Millstone grit and the Coal measures have been used to a limited extent for building purposes.

Syenites, Porphyries and Granites. Granite is very abundant among the older rocks of the Province. Among localities which have furnished it for building purposes, may be mentioned Shelburne, Queens and Lunenburg Counties. It also occurs at Aspotogan and various points thence to Halifax. As already mentioned, in describing the Gold fields, it runs continuously from Halifax to Windsor, and thence westward. It occurs again at Waverley, and runs through Musquodoboit, Jeddore, Ship Harbor, Sherbrooke, and Country Harbor to Canso. It occurs inland at the head waters of many of the Eastern rivers, and is estimated to cover a large area of the Atlantic coast district. It has, however, been quarried only at points accessible to shipping. At Halifax, it has been used a good deal about the fortifications, and a number of houses have been constructed of it, its cost, rough, being from $2.25 to $4.00 a ton.

In the Colequids there are masses of flesh and red colored syenite, which have afforded very handsome polished samples; but as yet have not been worked for construction. Porphyries and syenites occur in various parts of Cape Breton, but their economic value has not been tested. The following localities may be mentioned: St. Ann's, Boisdale and Coxheath. The crystalline diorites of Louisburg were used by the French in building their fortifications.

Limestones.—This material has not been used to any extent in Nova Scotia, for building purposes, although it is frequently found to stand exposure well, and to be readily quarried. Among localities yielding it, may be mentioned the Shubenacadie River, Kennetcook, Lower Horton, Thomp-

son Station; Glengarry and Springville, Pictou County. Stones from a quarry here retain, after an exposure of sixty years, every trace of the chisel or pick. The marbles will be noticed further on.

A flaggy arenaceous schist, known as iron stone, was extensively used some years ago for warehouses and walls in Halifax. Many of the metamorphic sandstones of the Atlantic coast would furnish a most pleasing and durable building material.

At present the supply of wood for building purposes is so plentiful that brick or stone houses are the exception. Even public buildings,

SAW GANG IN THE KLINE YARD AT HALIFAX

churches, halls, etc., are almost always of wood; but as this material becomes more expensive, the labor of the quarrymen will succeed that of the lumbermen, and our towns become something better than wooded shells blackened by smoke.

Flags and Slates.—A small amount of flagstone has been quarried on the Northwest Arm of Halifax Harbor, and at Beaver Bank. Slates were quarried to a small extent at Rawdon, and various places in Hants County, and the quality and quantity are equal to any demand. Dalhousie Mountain and West River, Pictou, are said to have good slate beds, and it is also reported from the South Mountain, in Digby and Yarmouth Counties.

At the Provincial Exhibition of 1879, slates were shown from Sackville, River John and Upper Stewiacke, which, although in the rough, were of good material.

The demand for roofing slates will become general in the province in a few years, as their superiority over the shingles in ordinary use becomes apparent.

In Nova Scotia the limestones are confined practically to the Lower Carboniferous, and are generally associated with the gypsums. There are also beds of this material, sometimes metamorphosed into marble, in the Laurentian, etc., of Cape Breton, and in the Cambrian and Silurian measures, but they do not usually form deposits of economic value in the latter measures. The carboniferous limestones are strongly developed in Cumberland, Colchester, Hants, Kings, Pictou and Antigonish Counties, and at many points in Cape Breton. They occur in beds varying in thickness from a few inches to 50 feet, and in some localities their aggregate dimensions will exceed 400 feet. Their quality varies from calcareous sandstones and clays to the crystalline pure mineral.

At Windsor, Brookfield and many other localities beds are found composed entirely of fossils characterizing the Marine Limestone formation, and give the following component parts on analysis by Dr. How:

Carbonate of lime	97.64
Carbonate of magnesia	1.10
Oxide of iron	.07
Phosphoric acid	trace.
Insoluble residue	.68

A limestone similar to the above was extensively quarried at Brookfield as a flux for the Londonderry iron ores.

The limestones of Pictou County are also well adapted for fluxes. The following analyses of a limestone from Lime Brook, Springville, were made for the Halifax Company at the Durham College of Physical Science:

	I.	II.
Lime carbonate	93.90	96.26
Magnesia carbonate	2.45	2.33
Iron peroxide	.59	.57
Manganese peroxide	.56	.55
Alumina	.12	.10
Sulphur	.03	.02
Phosphoric acid	.03	.03
Silica	2.10	1.99
Moisture	.18	.17

These results are confirmed by an extensive series of analyses made some years ago by the writer, embracing all the more important exposures of that mineral in the vicinity of the Pictou coal and iron deposits, but the space at my disposal would forbid its insertion. The position of the East river limestones forms an important item in their adaptability for fluxing purposes. They occur as a band everywhere between the coal and iron, so that their transport becomes a matter of comparatively low cost, and large quantities are available by simple quarry work. A quarry at Black Rock, above Bridgeville on the East Branch, has furnished flux for many years to the Ferrona furnace.

Some limestones at Horton, Onslow, the Joggins, Pugwash and other places are bituminous, and contain notable quantities of phosphoric acid. As already mentioned, some of the East River limestones contain important percentages of carbonate of iron, and may, at some localities, afford an ore of this metal, in addition to the spathic ores referred to before.

In Cape Breton, several places are known which afford marble believed to be well adapted for building and decorative purposes. The finest deposit of workable limestone yet discovered is on West Bay, Bras d'Or Lake. In variety of color and tint this rock resembles the limestones of the George River series, of which it forms a part, but it contains little or no admixture of foreign materials, and is uniform to texture and in unequalled abundance. The following varieties have been recognized:—

1. Fine white statuary marble.
2. Fine white building marble.
3. Coarse white building marble.
4. Blue and white clouded marble.
5. Brocatello marble, mixed with six varieties of colored marbles.
6. Fine flesh-colored marbles, often striped and variegated.

The locality offers every facility for quarrying and shipping, and blocks of any required dimensions can be shipped cheaply to the United States, equal in quality to those already admired as samples. These marbles are in many cases magnesian. At present large quantities of lime are burned here, and the Dominion Steel Company have extensive openings furnishing the flux for their furnaces at Sydney. The same company has also drawn largely upon the marble of George's River, in Cape Breton County, as a flux and for use in the concrete foundations of its furnaces, ovens, etc.

At St. Ann's Mountain, Cape Dauphin, Salmon Creek, Whyhogomah, River Dennis, George's River, French Valley and Escasoni, marbles are also found. At the latter place they are usually too much broken and mixed with other rock to be available for artistic purposes.

A magnesian limestone on the property of the Messrs. Burchell, at Kelly's Cove, Victoria County, has been extensively quarried by the Nova Scotia Steel Co. for linings for convertors, etc.

At Five Islands, Colchester County, promising marble deposits are known. The carboniferous and other limestones are quarried at all points for lime for building and agricultural purposes. That from East Bay has been extensively burned for lime. The Nova Scotia lime is frequently brown, arising probably from carelessness in selecting and burning; its price per barrel may be averaged at 95 cents. At numerous points in the province the limestones contain foreign ingredients, indicating the presence of a certain amount of hydraulicity, such as alumina, carbonate of iron, magnesia, silica, etc.

The well-known Portland cement was invented in accordance with the desire for a material which would set rapidly, and remain indurated in water. Lime, itself, is useless for this purpose, unless mixed with the proper proportions of an argillaceous compound. Many good natural cements have been used at various times, but the want of uniformity in the composition

of the calcareo argillaceous rocks they were made from soon rendered their action even dangerous.

In this province, although many limestones possess hydraulic qualities, their uniformity cannot be relied on. Hence, our cements, which are natural ones, have never proved permanently satisfactory. The limestones and clays of the province will answer for the manufacture of cement; but the absence of chalk requires more care in the manipulation of the limestone, and a consequently increased cost.

At present I am not aware of any Nova Scotia cement in the market, the Portland cement being generally called for in contracts and specifications. Among Nova Scotia limestones possessing hydraulicity may be mentioned those from Horton, Windsor, St. Peter's, Chester, Onslow, Shubenacadie, Springhill, Whyhogomah, etc. In the lockwork of St. Peter's Canal, Portland cement alone was used.

The quantity burnt for agricultural purposes must be very considerable; but no returns are made of the amount thus used, and in many parts of the province nature has supplied this fertilizer in abundance. The Mines Department gives the amount of limestones and ankerite quarried during the year 1900 at 50,000 tons, but this refers only to that used for smelting purposes, and does not include the amount extracted by individuals throughout the province.

EDWIN GILPIN, JR., A.M., LL.D., Chief Inspector of Mines.

AN ENGLISH VIEW OF AMERICAN MARBLES.

AMONG the many foreign visitors who have come to America in recent years, none has proved a more friendly, cordial and intelligent critic than Frederick Harrison, the great English essayist. On his return to England he has given his views on American architecture, and these are particularly interesting to readers of this magazine on account of the unstinted praise he gives to American marbles. Mr. Harrison says:

The White House, as the Executive Mansion is called, is interesting for its historic associations, which exactly cover the nineteenth century, with its portraits and reminiscences of Presidents and statesmen, and its characteristic simplicity and modest appointments. It is not a convenient residence for a President with such great responsibilities. But as the term of residence is usually so short and the associations of the house are so rich, it would be a pity to change it for a pretentious modern palace. In the meantime the quiet old mansion, merely a fine Georgian country house in a pleasant park, serves to remind the American citizen of the democratic origin of his Chief Magistrate, who is certainly not yet an Emperor. The White House was a residence suitable for men like Jefferson, Lincoln and Grant, and it seems a not unfitting office for their successors.

The Capitol, at Washington, struck me as being the most effective

mass of public buildings in the world, especially when viewed at some distance, and from the park in which it stands. I am well aware of certain constructive defects which have been insisted on by Fergusson and other critics; and no one pretends that it is a perfect design of the highest order either in originality or style. But as an effective public edifice of a grandiose kind, I doubt if any capitol city can show its equal. This is largely due to the admirable proportions of its central dome group, which I hold to be, from the pictorial point of view, more successful than those of St. Peter's, the Cathedral of Florence, Hagia Sophia, St. Isaac's the Panthéon, St. Paul's, or the new Cathedral of Berlin. But the unique effect is still more due to the magnificent site which the Capitol at Washington enjoys. I have no hesitation in saying that the site of the Capitol is the noblest in the world, if we exclude that of the Parthenon in its pristine glory. Neither Rome nor Constantinople, nor Florence, nor Paris, nor Berlin, nor London possesses any central eminence with broad open spaces on all sides, crowned by a vast pile covering nearly four acres and rising to a height of nearly 300 feet, which seems to dominate the whole city. Washington is the only capitol city which has this colossal center or crown. And Londoners can imagine the effect if their St. Paul's stood in an open park reaching from the Temple to Finsbury-circus, and the great creation of Wren were dazzling white marble and soared into an atmosphere of sunny light.

Of all that I saw in America, I look back with most emotion to my visit to Mount Vernon, the home and burial-place of George Washington. I saw it on a lovely spring day, amid thousands of pilgrims, in the inauguration week. On a finely-wooded bluff, rising above the grand Potomac River, stands the plain but spacious wooden house of the founder of the Republic. It has been preserved and partly restored with perfect taste, the original furniture, pictures and ornaments supplemented by fit contemporary pieces. It enables one perfectly to conjure up an image of the homely, large and generous life of the President before the war called him to the field and after he had retired from all cares of state. We fancy him sitting under the spacious eastern portico, with its eight tall columns, looking out over the broad landscape of forest and river, or lying in his last sleep in the simple bed, with its dimity coverlet, and then laid to rest in the rural tomb below the house, which he ordered himself, and in which his descendants have insisted on keeping his remains. General Grant lies beside the Hudson, at New York, in a magnificent mausoleum palpably imitated from the tomb of Napoleon in the Invalides. How infinitely more fitting and more touching is the Spartan simplicity of Washington's burial place—an austere cell within his own ancestral ground, yet not a morning's drive from the splendid capitol which the nation has named after its heroic founder—how much more fitting and more touching is this than the imperial mausoleum to which they have carried the bones of the tyrant who ruined France! It has been frequently attempted to remove the sarcophagus in which Washington lies from Mount Vernon, his home, to

place it under the dome of the Capitol. But as yet it has been wisely decided to do nothing that can impair the unique legend which has gathered round the memory of the Western Cincinnatus.

America is making violent efforts to evolve a national architecture but as yet it has produced little but miscellaneous imitations of European types and some wonderful constructive devices. A walk along the Broadway and Fifth Avenue of New York leaves the impression of an extraordinary medley of incongruous styles, highly ingenious adaptations, admirable artistic workmanship, triumphs of mechanics, the lavish use of splendid materials, and an architectural potpourri which almost rivals the Rue des Nations at the Paris Exhibition of 1900. There are some excellent copies of European buildings, such as the Giralda of Seville, Venetian palaces, chateaux from Touraine, Palladian loggie, and here and there a German schloss. There are some beautiful revivals of fine art, such as the thirteenth century Gothic of St. Patrick's, the Italian palaces of the Metropolitan and University Clubs, the Renaissance palaces of the Vanderbilts. Facing Central Park, each millionaire seems to have commissioned his architect to build him a mansion of any ancient style from Byzantine to the last French empire, provided only it was in contrast to the style of his neighbors. So commissioned, the artist has lavished skilful carving, singular ingenuity, and noble material in stone, marble and mosaic. Many of these are interesting experiments, and some are beautiful, but the general effect of such rampant eclecticism is rather bewildering.

In constructive novelties the American builder is consummate Among these are the Brobdignagian piles of twenty stories, the substitution of lifts for staircases, the construction of edifices of steel, the profuse use of stone and marble as ornaments rather than as material, the multiplication of baths, heating apparatus, electric and other mechanical devices, and the intensely modern and up-to-date contrivances which put to shame the clumsy conservatism of the Old World. Nothing in Europe, since the fall of old Rome and Byzantium, not even Genoa in its prime, has equalled the lavish use of magnificent marble columns, granite blocks and ornamental stone as we see it to-day in the United States. The Illinois Trust Bank, of Chicago—a vast marble palace—is, I suppose, the most sumptuous and one of the most beautiful commercial edifices in the world, and its safety deposit vaults are among the sights of that city.

The reckless use of precious marbles seems to threaten exhaustion of the quarries, but one is assured that they are ample for all demands. Why more use is not made in Europe of the magnificent marbles of America is not very obvious. But we certainly might easily adopt some of the constructive devices of their builders. Not, one trusts, the outrageous towers of Babel, in twenty or twenty-four floors and 500 rooms, built of steel, and faced with granite as a veneer which are seen in New York and Chicago, and hopelessly disfigure both cities. If these became general the streets would become dark and windy canyons, and

human nature would call out for their suppression. But the British architect has much to learn from modern American builders. In matters of construction the free use of new kinds of stone and wood, of plumbing, heating and the minor arts of fitting, the belated European in America feels himself a Rip Van Winkle, whirled into a new century and a later civilization.

THE GRANITE SITUATION HERE AND ABROAD.

A PECULIAR feature in the granite trade in its international aspects is to be noted just at this time. For some months past a great deal of attention has been given to the efforts made by some of the large Maine granite producers to find a market for their product in Great Britain. This has stirred the quarrymen in other granite centers with a desire to avail themselves of the same market. To the credit of the foreign granite men it must be said that they are not sitting quiet under this invasion of their territory, but are endeavoring to turn the tables on their American competitors. An effort will be made to import into this country more extensively than in the past some of the peculiar varieties of decorative granite that seem especially desired here. These are the colored and mottled granites for monumental purposes and for columns. America has a number of granite deposits in which the stone is of the most beautiful marking and color, but unfortunately the quarries are some distance from the market and are not on the direct line of the railroad. This is particularly true of the rich red granites of Wisconsin, which are equal to any in the world in color and texture. Until transportation facilities are greatly improved, however, these fine stones will be shut out from many markets.

This difficulty of transportation is one of the points that is holding back the development of some of the quarries in Great Britain. A correspondent of the "Master Builders' Association's Journal," of Liverpool, whose comments are always interesting, says, concerning the granite situation in that country: "The representatives of some of the largest firms operating in the Vermont district have lately visited this country and expressed their determination to develop business on this side of the Atlantic. It is a case of carrying the war into the enemy's camp, for the export of granite from this side to America has been going on for many years, although the trade has been sharply checked in recent times by a hostile tariff, which is all but prohibitive. The price quoted for the American samples is higher than that quoted for Scotch or Scandinavian, but some of them have a remarkably pleasing appearance, and knowing the enterprise of our American cousins, it is quite possible they may find a market here. They will, however, be greatly handicapped by what are apparently irreducible difficulties in the way of labor and transport costs.

"Meanwhile it is reported from Donegal that a syndicate of New York financiers has been formed to develop the granite quarries of that district, but there are so often reports of companies and syndicates being formed for

this purpose that any statement from the locality bearing upon the question must be taken with more than the customary grain of salt. That there are many magnificent deposits of granite in Donegal every expert knows, but the difficulty of getting them worked and the material transported in any quantity has hitherto proved insuperable. The real fact is that granite as a raw material is so very low in price as compared with its weight that a few shillings per ton of extra cost in transport is sufficient to put a whole producing district out of the market.

"This has been the case with the quarries on the eastern side of the county of Sutherland, and determined efforts are now being made to open the quarries in the western part of the county, where it will be more easy to find convenient access to shipping ports. Preparations are being made to carry on quarrying operations on an extensive scale in the spring at quarries close to Ben Loyal, between four and five miles from Tongue. A tramway is to be laid direct from the quarry to the shipping berth. The stone from this district is said to be of a bright gray color, close in grain, and remarkably free from blemishes or flaws."

BUILDING LEGENDS AND CURIOSITIES.

SOME months ago there was published in this magazine an article on " "Building Rites and Ceremonies." This had to do mainly with the customs that were followed in early days and among savage peoples in the dedication of buildings—ceremonies that were often attended by the sacrificing of human lives in the hope of warding off evil influences. Attention was also given to the more pleasant customs that followed the completion of certain portions of the building, marked by the fixing of the roof-tree, for instance. It was shown that in the Colonial days in America almost enough liquor was given in donations to the workmen to float the building. The article was widely copied, both in this country and in Europe, and a further collection of building legends is given by the "Evening Standard," of London. These have not the grewsome element of many of the propitiatory rites described in STONE, but deal rather with curious supernatural legends that have clustered about the matter-of-fact art of building. The writer recalls that it has been written of the spire of Chesterfield Church—which many consider wonderful, though, as a fact, it is only somewhat out of the perpendicular —

Poor devil! poor spite,
To make a spire a laughing-sight.

This rhyme refers to the perversity of the builder, who originally erected the church without a spire, but, being compelled to add one, made it crooked. One of the legends attributes the mischief to the Prince of Darkness, who one day, being fatigued, folded his wings and rested on the steeple. Some of the incense which was being wafted in the aisles below escaped from the church, crept up the steeple, and tickled the archfiend's nose to such purpose that he gave a terrific sneeze and so dislocated the steeple that it has been twisted ever since! Another tale in connection with this church is that on

the occasion of a wedding party passing into the building the steeple bowed to the bride and bridegroom and has remained crooked ever since. The same tradition attaches to an old church at Lancashire, of which it is said:

The church at Little Winwick,
  It stands upon a sod;
And when a maid gets married there
  The steeple gives a nod.

Alas! how many ages
  Their rapid flight have flown,
Since on that high and lofty spire
  There's moved a single stone.

It is a legend, dating from Mediæval, if not earlier, times, that in the erection of cathedrals and other edifices devoted to ecclesiastical uses the Prince of Darkness always claimed one human life as a sacrifice during the process of building, and, as if in confirmation of the gruesome legend, there is hardly a cathedral or minster in the world which has not some such story associated with it. For instance, at Shottesbroke, in Berkshire, the tale runs that when the capstone was being fixed on the spire the architect called for wine with which to drink the health of the King, and that after partaking thereof he fell down and was killed. Possibly the wine was drugged or was very potent. A coffin-shaped stone in the churchyard, bearing the letters "O! O!"—his exclamation as he fell—is said to mark the spot where he lies buried. The legend of St. Francis of Assissi, who rescued a poor mason from falling, and that associated with Sir James Thornhill's painting in the dome of St. Paul's Cathedral are too well known to call for recapitulation here.

Some of the legends handed down have reference to disputes among the workpeople. Thus the church at Minchinhampton, in Gloucestershire, is stated to have a portion of its roof formed of old gravestones, because there was a strike among the carpenters, and the woodwork, as a consequence, could not be completed according to the original design. History gives us many legends of persons who, after being engaged in the construction of secret chambers, have been put to death to prevent them from divulging the secret, while at other times it was the architect who was so treated that he might not construct any other building equally beautiful. Thus, in the church of Gouda, between Utrecht and Amsterdam, there is a handsome window of stained glass, the tradition concerning which is that on its completion the artist's eyes were put out for fear any other church should have a window so grand. Similar is the legend associated with the apprentice's pillar in Roslin Chapel, the young workman who executed this magnificent pillar being put to death on the return of his master, as much from feelings of jealousy as for any other reason. Other legends have reference to the dreams of more or less pious founders, one of the most ancient and trustworthy of these having reference to St. John's, at Chester, which, in 1075 was the bishopric church of the Chester see. The ancient legend runs: "King Ethelred, minding to build a church, was told where he should see a white

hind, there he should build a church, which white hind he saw in the place where St. John's Church standeth, and in remembrance thereof his picture was placed in the wall of the said church." The remains of the fresco on one of the Norman arches illustrates this legend. For Danbury, in Essex, his Satanic Majesty is represented to have a particular ill-will, as it is noticed by Hollinshed in his "Chronicles," and in "the Devil of Danbury" it is recorded that "Vpon Corpus Christi Day, in the yere 1402, the third of Henry IV., at evensong the Devil entered into this church, in the likeness of a grayfrier, and raged horribly, playing his parts like a Devil indeed, to the great astonishment and fear of the parishioners, and the same houre with a tempest of whirle wind and thunder the top of the steeple was broken downe, and halfe of the chancel scattered abroad." Another historian tells us that the Devil carried away the bell from the steeple in a kink of his tail; that in carrying it off to his Maldon home the kink loosened and the bell fell, and the place where it fell is known as Bell-hill Wood. The monks made diligent search for it, but the bell was never recovered, and it is there to this day if anyone cares to go searching for it. Another legend relates to Buckfastleigh Church, in Devonshire, where the building has been perched at the top of a steep flight of over 150 steps, the legend being that the building would be more out of the way of the devil if placed up high. We very much suspect, however, that they were more in fear of the Dane than the devil in those days, as the Dane was very much on mischief bent.

Many churches have legends associated with them, and generally in reference to some action of a former parson. Thus the following three jingles, relating to bells, are self-explanatory:

Arlesey, Arlesey, wicked people,
Sold their bells to build a steeple.
Owesby parish, wicked people,
Sold their bells to Kelsey to build a steeple.
A very fine trick of the Newing people,
To sell their bells to build a steeple.

Of Berwick, in Sussex, the local rhyme runs:

The parson was poor and so were the people,
So they sold the bells to repair the steeple.

And it is a fact that only one now remains out of four bells there in 1724. At Mevagissy, in Cornwall, the natives have the following rhyme:

Ye men of Porthilly,
Why were ye so silly,
In having so little power?
Ye sold every bell,
As Govan men tell,
For money to pull down your tower.

Visitors to the Kentish Coast are familiar with Minster and the ruins of its famous abbey, attached to one of the earliest monasteries founded, but probably not everyone is acquainted with the following legend respecting its origin: Dumneva, who had borne one son and two daughters to her husband and with him afterwards took a vow of chastity, requested that the

King would give her as much land as her tame deer could run over at one course, on which she might found a nunnery in memory of her deceased brothers, which the King readily granted. The deer was loosed and every endeavor was made by Thimor to obstruct its course, with the result that, so offended was heaven, the earth opened and swallowed him up at a place now known as Mount Pleasant Chalkpit. Meanwhile the deer continued its course, and never stopped till it had covered a track of land which exceeded 10,000 acres, which the King immediately bestowed on Dumneva, and the monastery was afterwards founded on the spot where "the present church now stands." Such, in brief, is the legend of the Abbey of Minster.

A STRIKING DISPLAY OF GREEN MARBLE.

THE display made by the United States Marble Company of Spokane at the Pan-American Exposition attracted a great deal of attention from the stone men who saw it, by its beauty and novelty. It consisted not only of slabs of the rich mottled green marbles which the company produces, but of many novelties like vases, pedestals, cups and saucers turned from stone and presenting the appearance of delicate glassware. The company has opened a New York branch at 2420 Park Row building, in charge of Mr. Charles E. Mitchell, treasurer and business manager, where a most interesting display of the varied products of the quarries is made. The company operates a number of separate quarries at Valley, Stevens County, Washington, and it also has a steam marble mill. There has been considerable talk of late of the marble resources of Washington, but the United States Marble Company was the first one in the field, and it has had experts carefully examine all of the deposits that have been found. It is the only company which has had any actual production of any account as yet.

From time to time, for several years back, this magazine has described the progress made by the company and its finds of richly varied marble. No less than seven distinct varieties are now put out by the company. What is called the Light Royal Washington is a yellowish green stone with some white markings and so translucent that the light is beautifully diffused through a slab nearly two inches in thickness. The Royal Washington is of the same color, but darker and more opaque. The variety which represents by far the larger output of the quarries is called Landscape, and this presents every variation of green, gray, brown and white mottlings. It is not in striped or banded effects generally, but in irregular clouds, which suggested the name. Athenian is a vivid green and white brecciated marble. What is known as Corinthian has the same general character and texture as the Athenian; but the mottling is in violet, yellow, green and white. All of these varieties, with the exception of Light Royal Washington, are suitable for interior decoration, the latter variety being mainly employed at present for the turned novelties. What is known as Diamond Black is a black crystalline marble with white mottling. This has been used to a considerable extent for monumental work, and the company produced it with

the sole idea of meeting a local demand. Considerable interest has been awakened in the stone, however, and there is a strong probability that it will be shipped to eastern points. Mr. Mitchell has just received a sample of a new variety for which no name has yet been decided upon. This is one of the most beautiful of all of the marbles shown. The body is of a delicate soft tone, similar to the finest specimens of Turquin Coquille or French gray. It is mottled with a vivid sea green. The sample is less than two inches in thickness, the back of it showing the surface that has weathered since the deposit was first formed. Despite the fact that the specimen was taken so close to the surface, it is perfectly sound and without discoloration. The weathered surface presents a most peculiar appearance, looking as if a green cement has been laid with a trowel in the interstices of a rough seamy stone.

The turned novelties are among the most striking articles ever manufactured from marble. As the stone is not of a crystalline nature, but is actually a serpentine, it is possible to turn it down so that the finished articles are no thicker than the so-called egg-shell china. Cups and saucers and wine glasses are shown that are as delicate as fragile porcelain or glass, and yet they have considerable strength. The vases are made after approved classical models. By the use of special machinery the company is able to undercut vases or pierce goblets down to the bottom of the thin shanks. The rich coloring and marking of the marble gives an effect as bewildering as that of favrile glass.

The stone is a peculiar deposit in every way. That it is eruptive and has been redeposited is shown by the nature of the mottling and veining. It is found in a huge bluff along the side of a ravine a short distance from the little town of Valley. The cap rock is black marble of considerable thickness. During the vast convulsion of nature, which brought the green marble toward the surface, the latter pressed against the black marble with tremendous force, turning it on edge and shattering the strata in many places. Although the company was compelled to go to the expense of removing many thousands of tons of the black marble in order to get at the green, the top rock served an excellent purpose. During the countless centuries that have elapsed since the deposit was formed, the black marble has thoroughly sheltered the green from the action of the weather, with the result that the latter stone is almost absolutely free from seams and dries, from all weather cracks, and from stains. The company does not intend to remove all of the top, but will get the green out by undercutting and tunneling. Several tunnels have already been cut, and the marble is being taken out in benches. At the present time the quarry floor is not in condition for satisfactory operation with channelers, but these machines can be put in shortly if desired.

When the green marble was first produced difficulty was experienced in polishing it. The stone would not yield to acid, and the ordinary putty powders were without effect. The company carried on constant experiments, however, and now they have succeeded in giving it a durable polish equal to that of foreign marbles.

MINERAL PRODUCTION OF CANADA.

THE tremendous advance that Canada has made in mineral production is shown by the preliminary statistical statement for the year 1901, just issued by the Geological Survey of Canada, and compiled by Elfric Drew Ingall. These are issued "subject to revision," but they may be taken as a very close approximation of the final figures. The value of the total output of the metallic and non-metallic minerals and the structural materials and clay products for the year 1901, was $69,407,031. The gain over the previous year, which had a value of $64,488,037, while satisfactory, does not seem so very large. The growth of the industry is shown by comparison with the value for 1899, which was only $49,584,027, while in 1886 the total output was only $10,221,255. Of course, by far the largest percentage of the mineral production is in the precious metals, although there was a falling off in the gold output. Asbestos and asbestic production amounted to $1,186,434. The value of the corundum produced was $53,115, and of the feldspar $4,710. Graphite to the amount of $28,880 was mined, and grindstones to the value of $55,690 were manufactured. Gypsum had a total value of $340,148, and limestone to the amount of $183,162 was quarried for fluxing purposes. The mica industry is growing to have an important place in Canada, as there are several excellent deposits that are being worked in a progressive manner. The value of the output was $160,000. The making of cement is developing rapidly in the province, and last year there was produced 133,328 barrels of the natural rock cement valued at $94,415, and 297,066 barrels of Portland cement valued at $535,615. There are large deposits of high grade cement making material in Canada, and a number of new plants of large capacity are now in process of erection. These will doubtless begin production early in the present year so that the output for 1902 may be expected to show very decided gains. The granite production was valued at $155,000, and the slate at $9,980. The Newfoundland slates have met with very high favor in Great Britain, and it is declared by many experts that the product cannot be told from the best Welsh slate. The industry has been started in a modest way, but a number of experienced slate makers have been brought from Wales, and the fact that the slate beds are conveniently situated for water shipment will doubtless lead to a large development in the export trade.

Unfortunately for the purpose of this magazine, the output of building stone is not given a separate entry, but is classed with bricks, limes, tiles, etc. The value of this class of building material was $4,820,000. The fact that little information can be drawn from the classing together of a number of unrelated industries, like the manufacture of brick and the production of building stone, is shown by the value given for these same building materials for 1900, viz.: $4,850,000. We scarcely believe

it fair to credit any portion of the $30,000 decrease in the past year to the production of building stone. If the exact figures are obtainable, we shall be surprised if they do not show a distinct gain. The falling off is more than likely to be in the lime output.

Accompanying the statistics are the following comments: "It is gratifying to note that the value of the mineral production of the country still increases, notwithstanding a considerable falling off in the gold output. The growth shown is equivalent to nearly 8 p. c. addition to the total value for 1900. This is, of course, a much smaller proportional increase than those shown during the previous few years, but it is encouraging to find that it is due to the large expansion of the more permanent mineral industries, such as the metallic, including iron smelting, with coal, coke, asbestos, etc., amongst the non-metallic. All along the line the evidence of this growth has been quite marked, giving great promise for the future, so that the inevitable falling off which must occur from time to time in the output of gold from shallow placer workings bids fair to be made up by the growth of those mineral industries that are now becoming such a factor in the commercial life of the country. Leaving the Yukon district out of consideration, the permanent metal mining industries show an increase of nearly 37 per cent. nothwithstanding a falling away of over 20 per cent. in the value of the lead production. The above, taken in connection with the enlarged value of the output of coal and coke of over 14 per cent., gives an average increase of over 27 per cent. for the more important industries of the country. The total value of the non-metallic products shows an increase of over 10 per cent. over last year, that of the whole metallic group nearly 6 per cent., while the structural materials remain about the same. The total value of the mineral production of Canada since 1886, when the statistics were first officially compiled, was but a little over one-seventh what it is to-day, although the population has only increased 17 per cent. in that time. The per capita value is now $12.92 as compared with $2.23 in 1886."

THE REGULATION OF THE USE OF EXPLOSIVES.

THE recent disastrous explosion in the Rapid Transit subway, New York, whereby hundreds of thousands of dollars of damage was done, including the wrecking of a magnificent hotel, and in which several lives were lost, has called general attention throughout the country to the use of explosives in public work. Under our form of government it is necessary that the regulation of such matters should be left to the different States, and there is naturally little uniformity in the laws relating to explosives. In Great Britain quarries and mines are brought within the control of the Home Office, and the most stringent regulations are enforced, not only with regard to the use of explosives, but also as to the fencing of open pits, the timbering of mine workings, etc. The excellent results of the system of regulation is shown by the various reports put

forth from the Home Office showing the list of accidents and analyzing them in detail. Considering the depth that most of the quarries have reached and the fact that many of the coal mines are notorious for the amount of gas they contain, it is surprising to Americans to learn the small proportion of accidents to the total number of men employed. Aside from exceptional circumstances, the number of accidents is steadily growing less, giving striking testimony to the efficiency of the inspection and the enforcement of the rules. The Home Office is constantly issuing circulars full of useful suggestions with regard to timbering, lights in mines and other practical questions. Every new explosive introduced is carefully examined, and only those which have stood all the tests are permitted to be used. For instance, at the present time only twenty-five explosives may be used in the coal mines of the United Kingdom. Whenever a new explosive is found to fulfill all requirements of the Home Office, a circular is issued, adding the new compound to the list of "permitted explosives." The last of these official circulars received from the Home Office by STONE magazine bears date of December 17, 1901, and adds to the list of "permitted explosives" Clydite and Victorite, manufactured by the Nobel's Explosives Company, Limited. and Haylite No. 1, manufactured by the National Explosives Company, Limited. In order to show the care that is exercised in these circulars, it may be interesting to quote from the official order the rules with regard to one of these explosives. They are as follows:

"Whereas by Section 6 of the Coal Mines Regulation Act, 1896, it is enacted that a Secretary of State, on being satisfied that any explosive is, or is likely to become, dangerous, may by Order prohibit the use thereof in any mine or in any class of mines, either absolutely or subject to conditions; and whereas in pursuance of this power an Order has been made by me entitled 'The Explosives in Coal Mines Order of the 1st October, 1901.'

"I hereby, in pursuance of the power conferred on me by the said section, make the following Order amending the Order aforesaid:

"(1) The Explosives in Coal Mines Order of the 1st October, 1901, shall be amended, and shall take effect as if the explosives named and defined in the Schedule to this Order were named and defined in the Schedule to that Order, and in all respects as if the Schedule to this Order formed part of the Schedule to that Order:

"(2) This Order may be cited as the Explosives in Coal Mines Order of 17th December, 1901.

CHAS. T. RITCHIE,
"One of His Majesty's Principal Secretaries of State.

"Home Office, Whitehall, 17th December, 1901.

"SCHEDULE.

*List of Permitted Explosives.**

"*Haylite* No. 1, consisting in every 100 parts by weight of the finished explosive of not more than 27 parts and not less than 25 parts of thoroughly purified nitro-glycerine, with not more than 1½ parts and not less than

*This list is subject to revision in accordance with the results of official tests made from time to time in the Government Testing Station at Woolwich. All the explosives now in the Schedule have passed the "Special Test" as laid down in the Home Office Memorandum of October 18, 1899.

half-a-part of nitro-cotton, carefully washed and purified, with not more than 14 parts and not less than 12 parts of wood-meal, provided that such wood-meal shall not contain more than 15 per cent. and not less than 5 per cent. by weight of moisture, with not more than 21 parts and not less than 19 parts of nitrate of potassium, with not more than 21 parts and not less than 19 parts of nitrate of barium, with not more than 8 parts and not less than 6 parts of mineral jelly free from acid, with not more than 12 parts and not less than 10 parts of oxalate of ammonium, and with no other ingredient; the whole being uniformly incorporated, and of such character and consistency as not to be liable to exudation. Provided:

"(1) That the explosive shall be used only when contained in a non-waterproofed wrapper of parchment paper;

"(2) That the explosive shall be used only with a detonator or electric detonator of not less strength than that known as No. 6 (*i. e.*, the detonator or electric detonator to be used shall possess an effective detonative strength as great as, or greater than, that of one containing 15 grains of a composition consisting in every 100 parts by weight of 80 parts of fulminate of mercury and 20 parts of chlorate of potassium);

"(3) That the explosive has been made at the works of the National Explosives Company, Limited, at Upton Towans, Gwythian, in the County of Cornwall;

"(4) That the explosive is in all respects similar to the sample submitted to test on the 21st day of November, 1901;

"(5) That in addition to the marking on the outer package required by an Order of the Secretary of State, made under the Explosives Act, 1875, and in force for the time being, such outer package shall bear the words 'As defined in the List of Permitted Explosives'; and, further, that each inner package shall be clearly marked with the words 'Permitted Explosive to be used only with not less than No. 6 detonator,' and also with the name of the explosive, the name of the manufacturer, the date and place of manufacture, and the nature and proportion of the ingredients; and

"(6) That the explosive, if in a frozen condition, shall be thoroughly thawed in a safe and suitable manner before use."

The rules are strictly enforced, and any violation subjects the offender to a heavy fine. Wherever the human element enters, however, no rules that can be devised will put an end to accidents. This fact is well brought out by the comment of a technical paper in England concerning one of the circulars issued by the Home Office, with regard to the proper construction and inspection of scaffolding and hoisting apparatus in building operations. The writer says: "Employers of labor will generally agree that the great difficulty is to get workmen to take proper precautions themselves, and often to obey stringent rules that have been laid down with a view of preventing accidents. It was only a few weeks ago that an inquest was held on the body of a quarryman who had kept up Christmas Eve with some fellow-

workmen in a cabin which contained several pounds of gunpowder in a tub. Regulations had been posted on the walls with regard to the storage of the powder; but this did not prevent the merry party having a fair amount of drink, and returning to what was in effect a powder magazine, as the best of all places in which, as one of the witnesses stated, "to enjoy themselves, with some bottles of beer in their pockets." Very naturally an explosion took place, which resulted in the hasty scattering of the whole party and the death of one. No regulations, however stringent, seem to be effective amongst the classes who risk life and limb by refusing to carry them into effect. Close supervision seems to be absolutely necessary, and this has become increasingly important since big blasts have become the fashion in quarrying operations. One of these recently fired at Bonawe Quarry is described as a main driven into the center of the quarry face for 70 feet, with two arms 50 feet each, and a chamber at either end of the arms in which was exploded 20,000 pounds of gunpowder. The mine was driven by rock drills and compressed air, and was carried through in ten weeks, the result of the operation being so successful that upwards of 250,000 tons of rock were displaced."

But the fact that accidents will occasionally occur even under the most stringent rules and rigid inspection is no excuse for a neglect by our law makers to provide every regulation that past experience can suggest. The local authorities in New York are making a careful investigation in order to fix the responsibility for the subway explosion. It should be learned, of course, whether the contractor violated the law by having on hand more than the permitted amount of explosive. The people should be equally interested, however, in learning whether there is anything in the laws of the State of New York that will prevent the storing of even half a dozen pounds of powerful explosive in the very heart of a city of several million inhabitants in a shaky wooden shanty with an open light and with a floor strewn with loose paper.

THE MARBLES OF SOUTH AFRICA.

THAT Africa contains deposits of the finest marble has been known almost as long as rare stones have been desired for building and decorative purposes. Those who reared the marvelous structures in Egypt made use of marbles that were often brought immense distances by the crude methods of transport then in vogue. At a later time, when Rome was in her glory, the builders of the Eternal City went across the Mediterranean for colored marbles to be used in their temples and luxurious palaces. From that time until the present, various quarries in Egypt and Algeria have rendered up their treasures to the architect and builder. The only deposits on the continent that have been worked to any extent, however, are those in Northern Africa, but that South Africa has beautiful colored marbles has been known for years. As long ago as 1894 this magazine briefly called attention to the rich deposits of the Lower Umzimkulu, Natal. At that time there was published a plea from the Messrs. Aiken, of Ruth-

ville, for the development of these deposits. These gentlemen declared that an enterprising Vermonter with an American outfit would in no time be supplying Cape Colony, Johannesburg, Pretoria and Natal with all the marble needed, and induce large trade in this stone where the cost of Italian stone is prohibitive. It was only a month or two ago that we printed a brief note concerning the marbles of German South Africa, and mentioned the fact that Emperor William admired the samples he had seen and would undoubtedly encourage the development of quarries.

Interesting particulars concerning the marbles of Natal are given in a letter written by Mr. Harry Hems, of Exeter, England, to the "Building News," of London. Mr. Hems is personally familiar with this field, and he writes in answer to a communication from some one signing himself "Architect." Mr. Hems says: Since personally visiting in the summer of 1898 the vast marble resources of the Lower Umzimkulu, situated upon the south-east borders of Natal, it is regrettable to record comparatively very little use has been made of the splendid wealth of marble that exists there. It should undoubtedly have been utilized upon the imposing new public buildings that have since then been erected in Pietermaritzburg; but apathy is a watchword in South Africa, and anything that requires go ("vim," they call it in the United States of America) finds no favor there. During my stay at Mafeking, in Bechuanaland, by way of illustration, the common saying was, "Whatever has to be done today let's put off for a fortnight!"

The Umzimkulu River empties itself into the Indian Ocean some 60 miles south of Durban, Natal's only and very beautiful port. It must not be confounded with the Umtavrina River or the Umzimoubu (known to the English generally as St. John's River), both of which lie slightly further south. This latter stream enters the sea under most romantic surroundings—immense precipitous rocks, over a thousand feet high, rise with Norwegian-like perpendicularity on each side of the mouth of the river, whilst the rare tropical foliage that grows upon these cliffs from their top down to the very water's edge add much to the fascination of the scene, especially when viewed from the seaboard. At the mouth of the Umzimkulu on the south side is situated a small town known as Port Shepstone. The place is reached by coasting steamers plying between Durban and East London at stated intervals, the passenger fare being £1. The usual route, however, and the one taken by myself, was by coach from Richmond-road Station, which is situated about 60 miles west of Durban, upon the Natal Government Railway. At Richmond-road the traveler is fully 3,000 feet above the sea. A coach goes from there once a day to Port Shepstone, a rough ride of about 60 miles at a fare of 35s.

The marble is found some five miles from the mouth of the river, the beds commencing just above the rapids. They are said to extend on both sides of the water for some miles, and to cover an area of several thousand acres, rising in places, one would guess, something like 1,000 feet above the stream, and I was assured boring operations have

proved going down considerably over 100 feet below the river's bed. Like the marble in the neighborhood of Carrara, in Italy, a locality where I spent some happy weeks last summer, there is not only a practically inexhaustible supply of the usual white variety, but there are also veins of various colors, some samples I saw being as red as Rosso Antico. There is, one may judge, almost as much marble in the immediate neighborhood of the Umzimkulu as there is in the Carrara and Massa districts. But, whilst Tuscany and Natal are somewhat alike in respect to the profuse and rich gifts of nature, the labor aspect between the two places is as wide as wide can be. The Italian quarrymen and masons, figuring as they do amongst the hardest working and most deserving of their respective crafts in the world, are most shamefully underpaid, whilst their South African counterparts (I do not refer to colored labor) are probably almost the best paid and the laziest! Curiously, in South Africa, upon the large Government buildings in hand at Pretoria, for instance, I found the best stonemasons were nearly invariably Australians, not Englishmen—a distinction that has since been conspicuous in the war, where the Australian mounted irregular troops are credited as proving themselves second to none, not even to the best of our owt regular cavalry.

There can be no doubt, in the erection of new public buildings in Pietermaritzburg, the Umzimkulu marble ought to have been largely employed. By wagon and by rail, the city is only removed—as the vulture flies—some sixty miles away, which, especially in a land of great distances, such as is South Africa, is comparatively nothing. One would have thought the necessary quarrying and cartage might have been done not only in the interests of Colonial dignity and self-reliance, but also with monetary advantage to those immediately concerned. But the prospect of procuring blocks of decent size in anything like regular quantity was so speculative a problem, that it appears the idea had to be reluctantly abandoned. So, for the nonce, Natal with resources, in the shape of marble sufficient to supply the needs of half the world, is content to procure most of what she requires for her home consumption from the distant shores of Italy. It must be a subject of grave regret to every broad thinker to realize, that if we put the matter of diamonds and gold on one side, South Africa, a land that, if she would only wake up, could and might do so much, is, and ever has been, distinctly and painfully a comparatively non-productive country. Things may alter, with much ingrafted fresh blood, after the war. Let us hope so. "Architect" is probably much misled by the statement made to him by a South African relative to Umzimkulu, that "its white marble is superior in hardness and color to the best Carrara." The assertion is simply a fair sample of the reckless way a large proportion of the people in those Colonies have of talking. I have been tempted to remonstrate with them by saying that when I cross to the United States of America I expect to hear folks "blow," for it is a great and wonderful country, and, admittedly, has a good right to be proud; but in South Africa the people "blow" with

nothing at all to bounce about! Lacking facilities or opportunities for actually using Natal marble, no opinion worth expressing can be obtained by a simple visit to the locality. One must open large blocks and work them, ere useful practical conclusions can be formed. Samples are proverbially misleading.

Talking of samples reminds me that, in 1873, I was returning from the Great Exhibition at Vienna, and on my way home stayed at Cologne to examine the progress then making towards the completion of the cathedral. It will be remembered the building of this great fabric was commenced in 1248, and the Devil then swore (it is credibly asserted) that human hands should never complete it. As a matter of fact, it took some six hundred and fifty years to prove his Satanic majesty in this resolve made a devil of a mistake! The then foreman of works was particularly nice fellow, and as I was somewhat struck by the quality of the fine white sandstone the masons were using, promised me a sample to take away with me. Afterwards, returning to the Hotel du Dome, I had forgotten the circumstance, when, by chance, I became aware that two workmen, who walked rather close to me, were staggering under the weight of a hand barrow laden by a great block of stone. At the hotel portal they stopped and rested from their load. Presently, the hall porter asked for instructions, for he told me the great stone on the barrow was a present from the cathedral foreman—a specimen to take to England!

The difficulty in judging marble is apparent, under the most favorable circumstances, at Carrara, where it is, of course, quite impossible to tell what a block of statuary may turn out to be until it is "opened." What, perhaps, struck me most during my lengthened visit to Carrara last year was the primitive appliances apparently everywhere in use for quarrying in the mountains, as well as the lack, at every hand, of labor-saving appliances. Manual labor—disgracefully cheap as it is—seemed paramount. Even in Carrara itself—of all the many marble yards in the city—I only saw one overhead traveler, and that did not look capable of lifting and carrying more than five or six tons. The lifting "jacks," too, in use were all of a very much out-of-date pattern, such as no one in England would think of using. No doubt it is to the United States we must look for the future rival to Carrara, if, indeed, it is ever to have a serious rival at all. There quarries are opened, and are continually opening, showing the unbounded resources of that great country. It can produce marbles of all kinds that will, at no distant day, compete with much prospect of success, as regard texture and the size of blocks, with anything Europe has, or is ever likely to produce. During my visits to the United States, I have invariably been greatly impressed by the vast variety of its marbles. When the marble trade in America is fully developed, it will assuredly open the eyes of all on this side of the Atlantic. At present, in this respect, too many of us apparently live in a fool's paradise!

MARBLE AND TALC OF NORTH CAROLINA.*

IN considering the talc deposits in North Carolina only those are discussed in this paper in which the mineral is suitable for grinding to a powder (flour talc) or cutting into pencils, and where it occurs in sufficient quantity to permit of its being mined for commercial purposes. While ordinary soapstone of good quality for cutting into slabs is found in large quantities in the State, it is usually too remote from the railroads to be profitable mining.

The only deposits of talc in quantity that are known at the present time in this State are in Swain and Cherokee counties. Talc was first mined about 1859, when a small amount was used as linings for the copper furnaces at Ducktown, Tenn. Mr. A. A. Campbell, of Murphy, N. C., was the pioneer talc miner in this State, and long before the railroads in that section were constructed he was mining and shipping talc by wagon to Cleveland, Tenn. With the price of talc at $80 per ton there was a profit even when it had to be hauled this distance. As the price dropped, its mining became unprofitable, but when the railroad entered this region talc mining was revived.

The talc formation begins in Swain County, about six miles east of the Valley River Mountains, follows up the valley of the Nantahala River to near the Macon County line, thence it ascends the Nelson Creek ravine and crosses the mountains at an altitude of 2,800 feet at Red Marble Gap. Entering Cherokee County, it then follows Valley River, broadening out near Andrews to a width of about one-half of a mile; it crosses the Valley River and the Hiwasse River and Valley in the vicinity of Murphy, and follows the Nottely River Valley, crossing the State line into Georgia.

All the deposits are located either alongside the railroad or in close proximity to it. The Murphy branch of the Southern Railway passes over the formation for almost the entire distance from its eastern end to Murphy. To the west of Murphy the Atlanta, Knoxville and Northern Railroad follows close to the talc and marble outcrops. Facilities for railway transportation at nearly all the deposits are of the best, and but little hauling by wagon is necessary, two miles being the longest distance from a shipping point on the railroad.

The rocks of the talc-bearing region in these southwestern counties are for the most part marble and quartzite, bordered by gneiss and crystalline schists. Repeated dynamic movements have twisted and folded the strata to such an extent that their original structure has been almost wholly obliterated, and in many cases it has changed considerably their mineralogical character. Part of the limestone has been metamorphosed and recrystallized into compact marbles of the finest quality, while the sandstone has been converted into a quartzite which at times is almost without perceptible granular structure.

So far as these beds of marble have been examined, they are for the

*From "Mineral Resources of the United States."

most part free from layers of silicates or quartz, except, of course, those in proximity to the contact with the quartzite. Near the contact, but in the marble, nearly pure white tremolite in prismatic crystals as large as a quarter of an inch in diameter has been found. The limestones which were first laid down and which were subsequently covered by the sandstone can be traced from about a mile east of Hewitt, Swain County, in a southwest direction across Swain, Macon, and Cherokee Counties into Georgia. The width of this marble belt varies from a few hundred yards to over half a mile along Valley River near Andrews, Cherokee County. The Valley River mountain ridge, the boundary between Macon and Cherokee Counties, is an anticlinal fold, with a northwest-southeast trend which marks rather sharply in some respects the character of certain formations to the northeast from those to the southwest. East of this ridge the marble quartzite formation is bounded on the north and south by a slate, while west of this ridge this formation is bounded on the south by crystalline schists and slates, on top of which are numerous beds of limonite iron ore. East of the ridge there are apparently no deposits of limonite. The depth of the stratum of marble has not been determined, but it is known to be over 100 feet.

The strata dip at all angles, due to their being repeatedly folded, but have a general trend of about N. 35° E.

It is in connection with this marble formation that the deposits of talc occur. What was formerly supposed to be a regular vein of the talc was probably a series of pockets of this mineral of varying thickness, lying for the most part directly between the marble and the quartzite, although at times entirely inclosed by the marble. No pockets, however, have been observed that were inclosed by the quartzite. These pockets, which resemble in shape flattened lenses, always follow the dip of the strata in which they occur, and are therefore encountered in all positions from horizontal to vertical.

These pockets of talc were once much more abundant than now. At the present time the only evidence as to the former existence of many of these is the occurrence of a bluish clay containing a few scattered flakes of talc. Wherever the quartzite capping of the pocket of talc has remained the talc is in a good state of preservation, but, on the other hand, wherever the quartzite has been removed by disintegration and erosion the talc has been either partially or wholly decomposed into the bluish clay. In places the talc is found wholly surrounded by the marble, as at the Kinsey mine, where small pockets or lenses of it are in the marble, but still close to the contact.

The beds of limonite iron ore are found closely associated with the marble and talc deposits between the Valley River Mountains and the Nottely Valley. The iron-ore, which always lies to the south of the talc, is sometimes almost in direct contact with it. The yellow stains observed upon so much of the talc in this region are undoubtedly due to its proximity to the iron ore. Although there are a number of iron-ore deposits in the Nottely River Valley, they are not in close proximity to the talc and

marble, and have exerted but little influence upon the character of the talc. It is in this valley that the most beautiful talc has been found.

Folding and subsequent erosion of the strata have brought the marble and talc to the surface at a number of points along the valleys of the Nottely and Valley rivers and on the slopes of some of the adjacent ridges. In the broader portions of the valleys the marble and talc are often covered by an alluvial soil which in places reaches a depth of from 20 to 30 feet.

The mining of the talc does not present any serious problems, as the deposits do not extend to any great depth. Those in the lowlands of the valley have to contend against water, which occasionally causes considerable loss of time. Most of the mines thus located have been worked by means of open pits, which during a period of rain have to be abandoned, owing to flooding. While some of these deposits, especially those on the hillsides, can be worked to advantage by an open pit, the majority of them can best be worked by shafts and tunnels, leaving one shaft as a pumping shaft and draining all the water from the others and the tunnels to this one. By using a series of tunnels one above the other the mine is kept as dry as it is practically possible.

At the Hewitt and Kinsey mines, from the nature of their location, the work has been successfully done by open cuts and tunnels. Little blasting is necessary at any of the mines, as the width of the deposit is usually sufficient for open cuts or tunnels without interfering to any great extent with the harder wall rocks.

As the rough blocks of talc are taken from the mine they are hand-cobbed, if necessary, and sorted into three grades. The larger pieces are cleaned by rubbing them with steel brushes and the smaller ones by an ordinary founder's scouring machine. They are then dried by being spread over a floor of steam pipes, which are kept at a temperature of about 212° F. When dry, the pieces are crushed and ground and the foreign material removed by screening. It is then further ground and passed through bolting cloth, making the final product of nearly uniform grain. In grinding or pulverizing the talc a buhrstone mill is used, as in grinding wheat. The ground product is handled very much like flour, and in filling the bags with the flour talc an ordinary flour packer is used.

North Carolina Talc and Mining Company.—The most important deposit east of Red Marble Gap is that at Hewitt station, owned by the North Carolina Talc and Mining Company. The talc deposits here are on the south face of a hill rising almost directly from the Nantahala River. The pocket of talc rests on a bed of marble, has a hanging wall of the same rock, and is capped by quartzite. This pocket or bed is almost continuous for nearly 1,500 feet and extends to the adjoining property of the Nantahala Talc and Marble Company. The deposit has been worked for about 500 feet in length by the North Carolina Talc and Mining Company, and the bed of talc has been penetrated to a depth of nearly 40 feet. Other pockets of talc have been opened and extensively mined to the west of this main pocket, but in the same range of hills.

To determine whether there was any considerable depth to the de-

posit, a drill was run into the hill for 95 feet, starting at about 15 feet above the railroad track, which is between the hill and the river. The drill penetrated through marble for the whole distance, which carried it beyond the north wall of the talc, showing that the deposit of the talc had pinched out at that depth. As the bed was worked toward the northeast it widened to 14 feet, making the average width of the deposit about 11 feet. The marble in contact with the talc is dolomitic in character, but contains a great deal (42.70 per cent.) of free quartz and tremolite.

Nantahala Talc and Marble Company.—Adjoining the property of the North Carolina Talc and Mining Company on the west is that of the Nantahala Talc and Marble Company. This company also owns the land adjoining the North Carolina Talc and Mining Company on the east. The occurrence here is very similar to that at Hewitts, the deposit being on the same range of hills rising from the Nantahala River and the property taking in part of the same vein. The talc is of good quality, and considerable of it is compact enough to be cut into pencils.

Southern Mineral Company.—Seven miles northeast of Murphy is the old Maltby mine, now owned by the Southern Mineral Company. The work done at this mine consists of a pit approximately 70 feet square and 10 to 20 feet deep, cutting across the bed of talc. Near the center of the pit a shaft 15 feet deep has been sunk, which penetrated the talc and entered a greenish talcose rock which was very gritty. A few feet to the south of the pit two additional shafts have been sunk to a depth of 30 feet, the lower 10 feet of which penetrated talc. But little work has been done to accurately determine the depth of the talc, but borings have been made at angles of 45° which penetrated talc for more than 50 feet. The southeast or hanging wall is a marble, and the northwest or foot wall is a quartzite. The dip of the strata is 5° to 10° SE. A little prospecting has been done in the vicinity of the mine, which shows the presence of pockets of talc which contain a great deal of tremolite. In excavating for the foundation of the mill talc was uncovered. The marble in contact with the talc is dolomitic in character and carries occasionally crystals of tremolite. As there is no chance to run a cut into the pit, all the talc and waste material are hoisted by whim and derrick.

Hayes mine.—This mine is about five miles northeast of Murphy and one mile southwest of Tomotla on the property of J. F. Hayes. On this talc deposit there is an open cut about 60 feet long, 40 feet wide, and 30 feet deep, which follows its contact with the marble on the southeast. Tests made by boring show that there is a considerable width and depth of talc at this mine, and test pits made 50 feet to the southwest and 200 feet to the northeast indicate that along the strike the pocket extends for some distance.

Hillyer mine.—This mine lies about four miles southwest of Murphy, close to the track of the Atlanta, Knoxville and Northern Railroad, and is the most important mine in this section.

Mining has been carried on quite extensively at this mine, which is one of the largest and best on the talc formation. Three shafts nearly in

a line with the strike of the rocks and 100 feet apart have been sunk on the bed of talc, which they penetrate for 27 feet, making the total depth of each shaft about 60 feet. The foot wall of quartzite is but 16 feet from the shafts, and dips nearly 30° SE. The width of the bed is known to be 40 feet, but no tests have been made to determine its actual width or depth. A little northwest of the line of shafts and 300 feet southeast a tunnel 100 feet long was run along the quartzite contact and good talc encountered.

This mine, which has yielded several thousand tons of the finest quality of talc, had been idle for a number of years, but has been recently purchased by the American Talc Company, and was reopened in June, 1900. This company has erected new buildings, and is thoroughly equipped with modern machinery for mining talc and preparing it for the market. Two new shafts have been sunk on the deposit, and talc was encountered in both at a depth of 40 feet, and at 70 feet solid talc is being mined. Drifts at a depth of 60 feet show the bed of talc to be 75 feet or more in width. This mine is being put into the best shape for producing talc in large quantities, and during 1901 it will add materially to the production of talc. During 1900 about 700 tons of pure white talc were mined in the development work.

Notla Marble and Talc Company.—This company's property is located at and in the vicinity of Kinsey, N. C., and the talc deposit is known as the Kinsey mine. The larger part of the talc from this mine has been found wholly within the marble, but near the contact of the marble with the quartzite. Two tunnels, one of them having a length of 75 feet, have been run in on the deposit, one 10 feet below the other. The talc occurs in a series of rather flat lenses, which yield a product of the finest quality, like that obtained from the Hillyer mine. That found at the contact between the marble and the quartzite is not of as good quality as the talc entirely surrounded by the marble. These pockets of talc at the Kinsey mine have been pretty thoroughly worked out. Blocks of talc have been obtained from this mine that have weighed nearly a thousand pounds. A mill connected with this property has a capacity of six tons of flour talc per day. The railroad passes by the mine and within a very short distance of the mill.

There has been but very little talc found to the southwest of the Kinsey mine, and nothing has been observed that has indicated the existence in that direction of any important deposits of this mineral.

JOSEPH HYDE PRATT.

MARKET FOR PHOSPHATES IN SPAIN.

THE trade in phosphates keeps steady pace with the manufacture of fertilizers. The article is also largely employed in making dynamite and other explosives.

Up to the present, Algeria has furnished almost the entire supply from its vast deposits near the Tunisian frontier, the phosphates being shipped from the port of Bone, usually in a ground state, as, I believe, only one or two firms in Spain possess the necessary grinding plant.

Small sailing vessels bring the phosphate to this country in the two

strengths of 58 to 63 per cent. and 63 to 70 per cent. of tribasic phosphate of lime; and as with a favorable wind these vessels can be depended on to reach a Mediterranean port in three or four days, and can be chartered at freights varying from 6 to 7 francs ($1.158 to $1.351) per ton, the advantage of the Algerian over the American phosphate in this respect is at once apparent. Manufacturers are at the same time fully alive to the value of the Florida rock phosphate, but as I understand this is at present shipped in the rock only, consumers of phosphate unprovided with grinding plant are unable to use it—a fact worthy of consideration on the part of shippers from the United States.

Notwithstanding the drawbacks of distance and heavy freights, the Florida article has a certain consumption in Spain, and has given such good results in one or two instances that some manufacturers have decided to use it altogether in future.

Business in phosphates is likely to increase, and I am informed that important works are in course of construction in one of the northwest provinces, which will require a large supply of the article. Our shippers should therefore carefully study the question of freights, and if these can be reduced so as to compete with those from Algeria, America may look forward to a good share of this trade. JULIUS G. LAY, Consul-General.

Barcelona.

IRISH STONE QUARRIES.

FREQUENT mention has been made in these columns of the development of the stone industry in Ireland, particularly in the line of marble, granite and slate. There are immense resources in the way of stone of the highest grade in Ireland, but the industry has been greatly hampered by lack of adequate transportation facilities. In addition to this drawback the local authorities do not seem to give any special encouragement to the native quarrymen. An interesting article on the Irish quarries appears in a recent number of the "Quarry," based upon information contained in an Irish paper. A summary of this follows:

The Royal Oak quarries are situated about a mile from Bagnalstown Railway Station, on the G. S. and W. Railway, and the like distance from the Grand Canal landing wharf, Bagnalstown. They have been worked for more than 140 years, and extend over an area of six acres. The output from these quarries consists of a hard, durable limestone, with occasional blocks of black marble. This latter is capable of a high polish, and in former days was extensively used for monumental work, mantelpieces, etc. The huge masses of limestone, after being quarried, are sawn to the requisite size for tombstones, crosses, etc. They frequently measure from 25 to 30 feet long in a single block. Mr. Brennan, proprietor of the quarries, sends stones to the counties of Cork, Mayo, Waterford, Dublin, Galway and Wrexford, and, in fact, all over the country. This special kind of limestone is invaluable for monumental work, being without faults of any kind. Crosses from 18 to 20 feet long are the feature in the works of the Royal Oak village.

Another striking feature is the quantity of large tombstones turned out there. But Mr. Brennan does not confine himself to monumental work alone. For more than 20 years he has supplied the G. S. and W. R. Works at Inchicore with stone for building purposes. There is a special department in the quarries which is devoted to the quarrying of stone to be used in buildings for rubble masonry, etc. The limestone is adapted for every purpose. The stone produces excellent lime, and for this commodity, naturally, there is a great demand.

The Rosbrien and Rathbane limestone quarries of Mr. M. D. Mathews, of 5 Old Wellington Terrace, Limerick, contain the blue and grey limestone measure generally found in that district. The stone is worked for the production of building material, and all dressed stone in connection with house construction and other works, such as bridges, breakwaters, and quay or dock walls, etc. It is also worked for the making of lime, and for macadam material for both country and city roads. Mr. Mathews keeps lime kilns burning on his extensive premises.

The limestone quarry worked by Messrs. Burnell & Company, of Edenderry, King's County, is situated at Carrick, some three miles from Edenderry. It is the property of Mr. C. C. Palmer, of Erahan House. The hill from which the quarry takes its name is an extensive range of oolite limestone, some of which, when well selected, is good material for monumental work. It is worked by the present occupier in that capacity and affords employment to some ten or twenty men, according to demand. The stone is well adapted for all sorts of cut stone, and is at its best in monumental work. The supply is practically inexhaustible, but owing to the method of working the quarry which prevailed in centuries gone by, an immense accumulation of rubbish defies the efforts of all who attempt to work it on a small scale. The result is that, with the present appliances, the best of the stone is wholly inaccessible. It is a mine of wealth hidden beneath hundreds of thousands of tons of bad stone and rubbish, waiting for the magic wand of some capitalist who would not be afraid to risk five or six thousand pounds in revealing it, and it would return capital thus invested a hundredfold and give employment to ten times the number of hands that at present find work there. The difference between the Carrick stone and the common lias limestone, found in flat or horizontal bedded quarries, consists in its being classed among the Irish marbles, and requires careful treatment, as it is easily fractured, as all marbles are. It is a representative Irish marble, the good being very good and the bad very bad. The latter at present predominates, owing to the lack of enterprise on the part of capital. The real good material forms a very small percentage of the total output, not more than 10 per cent. Like all quarries where the stone stands on end or in vertical layers, Carrick is considered dangerous. Notwithstanding that, however, accidents are extremely rare there.

The marble works at Kilkenny of the Irish Marble Company are situated on the banks of the Beautiful River Nore, about two miles south of the city of Kilkenny. The establishment of these works was the first direct attempt made to utilize the marble product of the soils in modern times. The

works were originally founded in the year 1730 by Mr. William Colles, a descendant of an old Worcestershire family, who, being a man of great mechanical genius and untiring energy, invented and brought to considerable perfection machinery adapted to the purpose of sawing, polishing, and boring marble. He was also the first person in Great Britain or Ireland who ever applied power to the working of marble, all the processes before his time having been performed by hand. Such was the success of his inventions that the business has ever since been carried on continuously at Kilkenny, and by the same family, Mr. Richard Colles being the fifth in succession from the original founder. The works were at first founded for the manufacture of the black fossil marble of Kilkenny, specimens of which, in the form of mantelpieces, etc., may be found all over the United Kingdom. The manufacture of other marbles, both native and foreign, has from time to time been added, and at present the Irish Marble Company manufacture nine or ten different varieties of Irish marbles, comprising the black and black fossil marbles of Kilkenny, the green serpentine marbles of Galway, and the red, pink, and gray of Cork and Kerry. An extensive trade in these specialties is done in all parts of Great Britain and Ireland, while the United States import a considerable number of columns, pedestals, dados, pavements, steps, mantelpieces, curbs, etc. The Irish Marble Company carry on a large business in Kilkenny gray limestone, which has been applied with great success to the restoration of Wells Cathedral some years ago, and in the new buildings for the Science and Art Department in Dublin.

The Parnell quarries at Arklow were started by the late Mr. Charles Stewart Parnell, who saw that the cutting of the tough dolerite, with which the district abounds, into paving setts would afford profitable employment to the people of the neighborhood. He worked the quarry till his death, giving at times employment to between three and four hundred persons. At his death the business passed into the hands of receivers, who carried on the work on a small scale for a couple of years, after which they put it up for sale, and it was bought as a going concern by Mr. John Howard Parnell for £1,200. There were only about ten or twelve men employed at the time, the other skilled workmen who were associated with the undertaking in its earlier days under the late Mr. Parnell having had to seek employment in England, Scotland, Wales, and even America. Mr. J. H. Parnell worked the quarry for a couple of years, and it then passed into the hands of the late Mr. T. H. Falkiner, brother of Sir Frederick Falkiner, Recorder of Dublin. Since Mr. Falkiner's death his successors in title continued to work the quarry until last September, when the business was converted into a limited liability company, of which the following are the directors: Mr. Thomas Scott, Messrs. Thomas Falkiner (nephews of the late Mr. Falkiner), and Mr. S. W. Wood, who is the manager of the concern. Considerable improvements have recently been effected in the equipment of the works, and it might be said that practically a new industry has been developed beside the old one of sett-making. In Mr. Parnell's time the clippings from the setts were regarded as so much waste, and they were disposed of by being piled up in banks, an operation which involved a considerable outlay and

produced no return. Under the new management this material, which was formerly regarded as waste, is now crushed into a very superior macadam, for which a ready market is found in many cities and towns in Ireland and Great Britain. In removing the waste which accumulated under former management, the present proprietors are clearing the way for the opening of a new vein of dolerite, which it is considered will give them even better material for sett-making than they have at present, although the setts now turned out are said to have no superior in Great Britain or Ireland. The company now gives constant employment to about 300 men, and pays a monthly wage bill of something like £1,000. When the new places are opened, which will be in a short time if the threatened closure of the works is averted, it is anticipated that the number of men employed will be considerably increased.

At one time Mr. Parnell had 70 sett-makers employed at the works, but the present company has only about half that number employed, owing to the great demand for macadam, and to the fact that they are clearing away the waste bunks. The weekly wage of the sett-maker varies from £2 to £4 a week, according to his capacity, and the unskilled workmen are paid from 15s. to 20s. per week each. It might be mentioned that the sett-makers have a local branch of the Stoneworkers' Union of Great Britain and Ireland, and that, so far as they know, the employers favor the existence of the union as being calculated to tend towards the betterment of the men generally. The proprietors are satisfied that they have the best material available anywhere, and they easily secure a high price for their setts. One of the sett-makers, Mr. Wm. Kavanagh, who has worked in the north of Ireland, in England, and Wales, and who spent two years in America, declares the material to be the most durable he had ever seen, but consequently the most difficult for the sett-makers to work. The English Corporation have realized this, but our Irish municipal bodies have not accorded it the same recognition. There is, however, an increasing demand both for the sett and the macadam sent out by this company. Bearing this in mind it will be seen that these quarries are a source of wealth not only to the people of the town of Arklow, but to the agriculturists of the surrounding districts as well. These farmers, both large and small, find a convenient market for their produce in Arklow, and many of them also get employment for their men and horses carting material for the company when farming operations are practically at a standstill. Yet the Rural District Council, which represents the agricultural community, has threatened the annihilation of this industry owing to its parsimoniousness with regard to the upkeep of about a mile of a public road, for the maintenance of which they are responsible. The works are situated about a mile and a half from the town of Arklow, and a short distance outside the town a public road branches off the main county road leading to Wrexford, and leads past the railway siding at Kish Hill on to the works, and then on to Kilmichael and Castletown.

ANCIENT ENGLISH FONTS.

SOME fine examples of stone work in the way of fonts are to be found in modern American churches. There are extremely few, however, that represent the tastes of the early times in this country, as the older churches that survive are mostly of denominations that make no use of fonts in their form of worship. Mr. Harry Hems has written an interesting letter to the "Architects' Magazine," of London, concerning early English fonts. Mr. Hems says that he knows no ancient fonts in England large enough for the immersion of adults, although he saw several of mediæval dates while enjoying a long holiday in Italy last summer. He adds: "The only modern instance I happen to be personally familiar with is in the Church of St. John the Evangelist, at Torquay—a strikingly handsome edifice, built from the designs of the late Mr. Geo. E. Street, R. A., in 1865-71. There, the font, fashioned out of an immense block of red (apparently Ipplepen) Devonshire marble, is situated on the south side under the western tower, and is descended into bodily during the sacrament of baptism. A flight of steps lead down into it.

"Outside ignorance and apathy in regard to the age of fonts is remarkable. Some ill-informed people, too, entertain the cherished idea that examples of Saxon fonts exist in our midst. There is no foundation whatever for such a conclusion. I have twice within a fortnight, in the columns of the 'Western Times,' a paper of some local repute, had to contradict the statements of correspondents who gravely declare the 15th century font in S. Sidwell's, and the Norman one in S. Mary's Steps, both old Exeter churches, are of Saxon origin. Further, and this throws an almost comical sidelight upon such foolish conclusions, a couple of mornings ago a 'West Countrie' newspaper assured its readers the 15th century font in S. John's, in the Wilderness Church, near Exmouth, S. Devon, was Saxon. The foundation, seriously given, for this assertion was that it bore the incised date '911'; numerals, plain enough to the ordinary practiced eye, the work of an ambitious school boy—at some time—cut into the face of the soft Beer stone (out of which it is masoned) by his pocket knife!

"No ancient wooden fonts, I believe, are known to exist save the one that is, or was, at Cobham Church, Surrey (as a matter of actual fact really one of lead surrounded by wooden panels), and one fashioned out of an octagonal block of oak, to be seen in Efenechtyd Church, near Ruthin. Of leaden fonts many still remain; they are nearly all Norman date, and generally circular on plan.

"The position of the font in the ancient English churches has nearly always been at the extreme west end. In instances where, upon plan, an old church has north and south-west porches opposite to one another, the font was often placed in the center of the nave immediately between and betwixt the two. At baptisms, both porch doors were kept open, the general superstition being that upon these solemn functions the Holy Spirit came in at the south door and the Devil flew out by the north!"

CARRARA MARBLE EXPORTERS' ASSOCIATION.

THERE has recently been organized at Carrara an association of marble exporters, known as the "Unione fràgli Esportatori di Marmo." The objects of this association, as set forth in a circular issued by the president, Bernardo Fabbricotti, are:

(1) To unite in one association the individual energies of the members for the purpose of regulating and developing the marble trade and for the protection of exporters and purchasers of marble.

(2) To formulate and adopt from time to time a tariff fixing minimum prices under which no member of the association will be allowed to sell.

(3) To fix rules and conditions of sale.

This association is composed of about forty different firms and individuals formerly acting independently, and comprises the leading producers and exporters of marble at Carrara. Its formation is the natural result of a long period of active and severe competition between the various concerns who are its members. It will be, I believe, of material benefit alike to the exporters and to the importers of Carrara marble throughout the world.

The trade between Carrara and the United States has during the past year (1901) shown a decided increase. From an average annual exportation of about $575,000 during the ten previous years, it has suddenly jumped to $761,812.50 for 1901. This advance of about 30 per cent. has brought the exportations to the highest point of which I have any record, and from present indications there will be no falling off in the amount during this year.

The organization of such an association as the one mentioned and the consequent control by it of this large volume of business must necessarily be of importance to our producers and manufacturers of marble, with whose product the output of Carrara enters into direct competition; and if its objects as to the regulation of prices, rules and conditions of sale, etc., can be realized, the result will doubtless be advantageous to them, in so far at least as it tends to prevent in future unsettled conditions and at times ruinously low prices.

JAS. A. SMITH, Consul.

Leghorn.

Comment on Timely Topics

DEPRESSION IN THE MICA INDUSTRY ABROAD.

THE mica industry of the United States is in a very satisfactory condition, owing to demands for the material for many new purposes, chiefly electrical, which have made possible the use of scrap mica. But in Europe mica, in common with many other articles, suffered from the prevailing depression in trade, according to the "British Trade Review." In Germany, the commercial crisis has accentuated the depression in the electrical trades. As that country is one of the largest customers for Indian mica, this has slackened demand generally, especially as regards the larger-sized slabs. While the European demand all round has been quiet, stocks of good useful sizes and qualities have been in short supply, and, should enquiries continue to run on medium grades and the larger remain neglected, it is not unlikely that values for the smaller sizes will go to a premium. Nature has, unfortunately, not arranged the mica crystals in convenient lots of graded sizes. Thus, taking Bengal mica at the present time, there is no incentive to either the European or the native mine-owners to work their deposits to their full capacity. The grades at present mostly sought after are, perhaps, Nos. 3, 4 and 5, the latter either in the form of slabs or splittings. To provide these grades means also the mining of the larger crystals and the accumulation of stocks of the very sizes for the sale of which the mines mainly depend for their profits. These remarks apply specially to Bengal, but also to Madras in a lesser degree. Imports into the United Kingdom for 1901, as compared with 1900, show a decrease both from Calcutta and Madras. Owing to mica not being classified by itself in the official returns, only approximate quantities can be arrived at, but Messrs. Tulloch & Company estimate the imports from Calcutta at about 6,200 cases, and about 6,100 cases from Madras. Direct importations to Continental ports amount to about 400 cases.

During 1901 South American mica was also in evidence to a larger extent, but no detailed returns are obtainable. Canada has also exported a rather larger quantity to the United Kingdom and Continent, but this description does not attract much support at present from the electrical trades. Stocks in London in importers' hands of good quality and useful sizes are light, smaller, indeed, than for some time past. The firm estimate that at the present time stocks of Calcutta clear ruby and ruby stained do not amount to over 600 cases. In this estimate they

exclude Nos. 5 and 6 grades, also films. As regards Madras, roughly, they estimate stocks of good quality and salable sizes to amount to not over 1,400 cases. In this case also they eliminate the heavy stocks of Madras smalls and splittings which are still in warehouse, but do not come under the category of good merchantable sizes or quality. The firm add that the apathy shown by buyers in face of the above good statistical position is proof of the current very small consumption by the trade.

CELTIC INTERLACE PATTERNS.

THE taste of the day in the matter of monumental work is running largely toward Celtic crosses, and some large and beautiful ones have recently been erected in this country. A month or two ago mention was made of a monument of this order, very large and costly, now being erected in the Albany Rural Cemetery for Judge Andrew Hamilton, after a design of Marcus T. Reynolds, of that city. The favor in which these crosses are held gives importance to the Celtic interlaced tracery, which forms the appropriate style of ornamentation for this form of monument. An excellent example of the interlaced ornamentation is to be found on the cover of STONE magazine, designed by Mr. Charles Selkirk, of Albany.

A paper on the process for producing Celtic interlaced patterns was recently read by Mr. Thomas Cooke Trench at the Convention of the Association of Master Painters, held in Dublin, Ireland. It has had a practical application in the Church of St. Michael, Clane. The difficulty to be overcome is mainly the prevention of crossings of the ribbons at inapposite places. By the French system the artist first covered the space to be dealt with with lines crossing one another, and woven in and out like basketwork. He then proceeded to join all the ends, two and two together, and finally he obliterated crossings here and there, joining the ends thereby set free in a manner differing from that which they originally followed. Any one could join ends, any one could obliterate crossings, but the excellence of the pattern consisted in the skill with which those processes were carried out, and therein lay the art.

The development of interlaced patterns is well adapted to occupy the leisure of amateurs, says "The Architect and Contract Reporter," of London. Men and women of that class could hardly be more innocently employed during their leisure hours than by adorning Irish churches, where there is no money to pay decorators, with the ancient forms, which easily can be made to appear as if they were without beginning or end. But if the work can in that way be produced gratuitously or for the cost of the materials employed, it is not to be supposed that members of the Association of Master Painters would undertake contracts on similar terms. Much is now said about the beauty of Celtic ornament, but there is a general agreement that its financial aspects must be carefully avoided.

The H. M. Dalton Stone Company has been incorporated at Boonville, Ind., with a capital stock of $45,000. The officers are: President, C. P. White, of Booneville, Ind.; secretary, John P. Weyerbacher, of Boonville, Ind.; vice-president and general manager, H. M. Dalton, Hopkinsville, Ky. Mr. White is the president of a lumber company and is a large road contractor. Mr. Dalton is an experienced quarryman, who began operations at Hopkinsville in 1896. His business soon grew to large proportions, and a very complete plant has gradually been erected. The present incorporation is for the purpose of extending the business by increased capital. New and improved machinery will be added. The company owns 150 acres of stone land and will deal in building and crushed stone.

The Medina Stone Company, of Newport, Penn., has been incorporated under the laws of Delaware to engage in stone quarrying. The capital is $75,000.

A new quarry will be opened on the south side of Hogansville, Ga., by the Middle Georgia Granite Company. The stone is declared to be of high grade.

The Maine and New Hampshire Granite Company have shipped from their quarries at North Jay, Me., a second large block of granite for the Smith Memorial Arch, Fairmount Park, Philadelphia. The stone measured 8 by 12 by 4 feet.

Luckenmeyer Bros., of Melrose, Minn., have purchased the Drake granite quarry, three miles from St. Cloud, from the Franklin Investment Company of St. Paul. The property consists of eleven acres. The new owners will begin to operate the quarry at once.

The quarry of Libersont, Innes & Cruickshank, at Websterville, Vt., has just been equipped with a new 75-ton derrick and hoist.

M. G. Ryan & Co., of New York, who purchased 23 acres at the Settlement quarries, Stonington, Me., some time ago, have been at work for six months, and have spent thousands of dollars in equipping a modern plant. A crib dock, 150 feet in length, has been completed. A double track gravity railroad, 735 feet in length, has been built, and by April 1 the entire plant will be ready for operation. The firm has the contract for furnishing the granite for the approaches to the new East River brigde, New York, on both sides. It is expected that they will give employment at their quarries to 150 or 200 men when the season opens.

Parker, Ryan & Co., who purchased the Goss & Small quarry on Crotch Island, Me., some months ago, are installing a complete compressed air plant. This will be used in the operation of the railroad, drills, derricks, etc. It is the first plant of the kind in Maine.

The quarry of the recently organized Wabash Stone Company, of Steubenville, O., is on Long Run, near Dillonvale, on the Wheeling & Lake Erie Railroad. The stone is of a blue-gray color and of fine quality.

Edward W. Burger has leased a quarry in the Valley-of-the-Rocks, near Paterson, N. J., and will instal a crusher. Mr. Burger will engage in contracting and road construction.

The quarries at Granite, near Woodstock, Md., have begun operations and a busy season is expected.

The firm of Swingle & Falconer has purchased the dark granite quarry of Elcock & Sons, at Quincy, one of the largest in that section.

Erie County is considering the question

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of employing its prisoners in quarrying rock for road building.

H. F. Johnson will open a stone and sand quarry in West Coatesville, Pa.

The Decker's Creek Stone and Sand Company has been incorporated at Morgantown, W. Va., for quarrying sand and stone. The capital stock is $25,000, and the incorporators are G. C. Sturgiss, J. A. Martin, E. T. Schultz, R. A. Vance and F. P. Corbin, all of Morgantown.

Norman Lindsay has purchased the interest of Alexander Morrison in the Blue Mountain granite quarry at South Ryegate, Vt.

R. W. Davis has opened a quarry at Sugar Hill, near Washington, Pa.

The Erie Railway Company is negotiating for the J. S. Wright quarry at Scio, N. Y. If the stone proves satisfactory a crusher will be installed and the product used for ballasting.

Frank Hagan has opened a quarry near Hopwood, Pa., and is geting out stone for flux.

The Maguire quarry on the Saugerties road, near Kingston, which was operated last year by the Kingston Limestone Quarrying and Contracting Company, and was recently sold to Eugene Beales, will be opened at once with a full force of men.

McKusick, Hanson & Hinckley have purchased a granite quarry at the Ledge, New Brunswick, just over the border from Calais. The quarry contains stone of the blue-gray variety.

New York parties have bought the old Andrews granite quarry on the Alfred road, near Biddeford, Me. John Leavitt, a well-known stone contractor, is the superintendent in charge.

The Delaware Granite and Mining Company, of Wilmington, has begun once more the shipment of stone to Gloucester, N. J., where it has a large paving contract.

The Hamilton Stone and Quarry Company, of Muncie, Ind., which has been idle for a year, has ordered new machinery and will begin operations as soon as it is installed.

The New Ulm, Minn., Stone Company, which has been in operation only a short time, has already declared an 8 per cent dividend. The company hopes to build a switch to its quarry, which is east of the city, and will then erect a crushing plant.

The Fit Form for the Baluster.

Balusters (which Italian artists invented) are obviously miniature columns, but not copied from columns. No, they are truly imitated, modified to their less structural, more decorative station by a sacrifice of structural to decorative fitness, i. e., of statical to mere formal beauty. Statical beauty is most fully developed in the Doric column, but mere eumorphy attained its perfection in the ancient vases. Take a column and a vase reduced to the same height and drawn on the same axial line, and draw a third outline whose ordinates shall everywhere be a mean between those of the column and the vase, there will be obtained a form fit for a baluster, says "The Architect and Contract Reporter." The baluster (the most successful novelty ever introduced by the moderns), if not an invention of genius, was at least one of refined taste. It fell, however, before the popular English notion of lightness. Those who think a building is rendered light by the omission or utmost possible reduction of eaves and other projections (i. e., by giving it as much as possible the appearance of a solid block) think, of course, that the balustrade is heavier than a massive solid dado (taken from the foot of a building to be placed on the top), and looks heavier than a row of square sticks, in which the opposite qualities of flimsy substance and the severest gravity of form of course neutralize each other, and produce sheer negation of art by themselves; but in a composition, positive ugliness, positive anti-art, which is indeed what lightness generally means with us.

Egg-Shell Finish for Granite.

The rebuilding of London has been made possible by the great increase in site values. As a consequence old and dilapidated premises are being rapidly cleared away, and the sites occupied by substantial buildings, good for some generations. The handsome addition to the line of frontage in Tottenham Court Road has recently been erected in the shape of the rebuilt Apollo Tavern—a five-storied building, supported on massive columns of Swedish granite. These were the work of Messrs. Arthur Lee & Bros., Ltd., Bristol.

The same firm is occupied in the erection of the granite front for the new premises of the Capital and Counties Bank at Brighton. This is being carried out in a style known as egg-shell finish, the surface of the granite being sufficiently smooth to show the beauty of the material, but not so highly polished as to reflect bright lines of light. One striking feature of the building will be the principal doorway, which will be carved in high relief. The upper portion of the building will be carried out in Bath stone.

Marble and Granite

John L. Goss has opened his sheds on Moose Island, Me., for stonecutting. One of his latest contracts is for furnishing pilasters and foundation stone for the new Harvard dormitory.

Worden Brothers have made extensive improvements in their marble and granite works at Dansville, N. Y. A new polishing mill has been erected, and a new compressor and pneumatic tools added. The business was established in 1885 and has been very prosperous. Until 1898 all the manufacturing was done in the New England States, but in that year the works were removed to Dansville. The firm has branches in several cities in western New York.

James B. Clow & Son will erect a new marble mill, 54 x 210 feet and costing $50,000, on South Western avenue, near Twenty-fourth street, Chicago.

The contract for the marble work for the ground floor of the State house, Topeka, Kan., has been awarded to the Peoria Stone and Marble Works, of Peoria, Ill. Its bid was $17,562. The contract includes marble tiling for the floor and marble wainscoting for the corridors and rotunda.

Charles A. Goodwin will establish a marble and granite works at Raleigh, N. C. He will do not only monumental work, but also all kinds of cut stone work for building. Mr. Goodwin was formerly connected with the Raleigh Marble Works.

The Machias Granite Co., of Machias, Me., has sold its monumental business to Calvin Butler, of Sullivan, and William Scott, of West Eden, Me., who will do business under the firm name of Butler & Scott. The transfer included the polishing mills, tools, machinery, etc., but not the stock of monuments on hand.

On May 17, 1901, J. V. Bycklin and Gustav Mackey were killed by the breaking of a derrick boom in the quarries of the Webb Granite & Construction Company, at Marlboro, N. H. Their administrator sued the company for $7,000 damages for each. The jury awarded damages in the case of Bycklin at $1,495.84, and in the case of Mackey, $3,250. The company has appealed.

Litigation has arisen between the United States Marble Company and the Colonial Marble Company, of Spokane. The former company brought suit against the latter for $100,000 damages, claiming that the Colonial Company was using samples and printed matter of the United States Company to develop its own business. The Colonial Company rejoined with a $50,000 libel suit against the United States Company.

Because of trouble between the Quincy and the Barre associations arising over the strike two years ago, the Quincy organization sought to withdraw from the New England Granite Manufacturers' Association at the recent meeting. During the trouble with the cutters two years ago, the Barre manufacturers settled without a strike, while at Quincy the men were out several weeks. The Quincy association thought all members of the New England association should have stood by each other. After a long discussion it was voted not to accept Quincy's withdrawal, but to pay the Quincy association $1,012, due from the Barre association.

A. E. Torrelle, of Spokane, has purchased three marble claims, consisting of 60 acres, near Bossburg, Wash. A company will be formed to develop the property, and a plant will be installed in the spring. The marble is white, dove, brown, blue, gray and variegated in color.

Peter C. Foley, the well-known marble and granite man of Olean, N. Y., has been elected mayor of that city by 300 majority. Mr. Foley is a Democrat, and the city is strongly Republican.

C. W. Cullen and William H. Wilson will open a marble yard on Pine street, Georgetown, Del.

The Standard Marble Company, of Spokane, Wash., has been incorporated, with a capital stock of $150,000.

James Mackay, president of the Barre board of aldermen and a member of the granite manufacturing firm of Imlah & Co., has accepted the management of the new granite exchange, with central office at Barre. Mr. Mackay is a native of Scotland, and went to Barre 15 years ago. He was for three years president of the Barre Granite Manufacturers' Association.

The New York "Times" says: "A combination is being formed of the quarry owners and marble dealers, the effort, at this time, being almost entirely confined to those engaged in the business in this city. But, if the preliminaries are successfully arranged, it is intended to so extend the corporation that it will embrace every marble firm or quarry owner of any consequence in the United States. The principal firms in New York interested in the movement are Batterson & Eisele of Eleventh avenue, Fisher & Co. of Houston street, and John A. Shipway & Brother of Locust avenue and One Hundred and Thirty-fifth street."

The Bay State Pink Granite Company has vacated its offices at Worcester, Mass., occupied for a number of years, and removed its books to New York, where its headquarters will hereafter be.

The Weiss & Jennett Marble Company, of St. Louis, Mo., has been incorporated by Joseph Weiss, George Jennette, John Fausek and others.

The Great Northern and Northern Pacific companies will grant a reduction on monumental freight rates between St. Cloud and St. Paul, from 22 cents to 17 cents per hundred.

The Rutland-Florence Marble Company will erect a store and office building and several dwellings at Florence, Vt., in the spring. The company will also engage in farming on an extensive scale.

The Fox-Becker Granite Company, of Middletown, Conn., has been incorporated with a capital stock of $25,000, by James C. Fox, Frederick C. Becker, and Richard L. Buell, all of Middletown.

John Wolf, a granite dealer of Quincy, Mass., has filed a petition in bankruptcy, with liabilities of $2,701.70 and assets of $300.

The Zeran Marble & Granite Works, of Cairo, Ill., has increased its capital stock from $5,000 to $25,000.

Reorganization of the Vermont Marble Company.

When the Vermont Marble Company was organized in 1880, in view of the fact that its capital stock was in excess of the amount of capitalization allowed to a corporation organized under the general laws of the State of Vermont, and because there were New York parties largely interested in the enterprise, the charter of the corporation was taken out under the laws of the State of New York.

By act of the Legislature of Vermont, approved November 27, 1894, the company was authorized to reorganize under the laws of that State. Some obstacles intervened to prevent the accomplishment of that purpose at the time as desired by the Vermont stockholders, but during the past year the Vermont Marble Company, a Vermont corporation, has been organized under the act of the Legislature above referred to, and has succeeded to all the property of whatsoever kind and wheresoever situated of the New York corporation, which has gone into voluntary liquidation.

The Vermont Marble Company, a Vermont corporation, in succeeding to the property of the New York corporation expressly assumed all of its bonds, contracts and other obligations. The Vermont company has long been practically a Vermont company as it has been managed by Vermont men and Senator Proctor has for many years owned a majority of its stock. It has now become exclusively a Vermont enterprise, as its entire capital stock is held by Senator Proctor and by those who are actively connected locally with the management and direction of its affairs. The directors are: President, Fletcher D. Proctor; vice-president and counsel, Frank C. Partridge; treasurer, Edmund R. Morse; superintendent Center Rutland division, S. A. Howard; superintendent of sales and chief marble expert, B. F. Taylor; secretary and superintendent of finishing department, W. E. Higbee; superintendent Proctor division and chief engineer, George H. Davis; superintendent West Rutland division, George C. Robinson.

All the directors and some of the others in more responsible positions in the business are stockholders. The company employs at its quarries and mills at Proctor, West Rutland, Center Rutland and Pittsford from 2,000 to 2,500 men. It has branches in Boston, New York, Philadelphia, Cleveland, Chicago, St. Louis and San Francisco and ships marble to Australia, India, China, Japan, Europe, and practically to all parts of the civilized world.

Want a Stone Bridge.

Hartford is to build a new bridge over the Connecticut River, and various styles of structure have been suggested. The almost unanimous sentiment seem to be in favor of a stone rather than a steel bridge. The Board of Trade has passed a resolution to this effect, and the Landlords' Association has urged the Common Council and the Bridge Commission to decide in favor of a stone bridge.

Limestone and Sandstone

Captain Henry Henley has retired from the Henley Stone Company, of Bloomington, Ind., his interests having been purchased by his partners. The name of the company has been changed to the South Side Stone Company. Captain Henley's place as president is taken by John Campbell, who will continue to superintend the plant.

The Yawger & Battlefield Stone Contracting Company has purchased the Smith quarries at Ludlow Falls, O., and it will also open additional quarries. From sixty to 100 men will be employed. The company has already four large steam hoists and two crushers of the largest size.

It is authoritatively announced that the Allegheny quarries at Sandstone, near Lancaster, O., will resume operations as soon as the weather permits. There was a rumor that they would be closed.

The sale of the property of the Kingston Limestone Quarrying and Contracting Company, in the town of Ulster, was to have taken place recently. Objection to the sale was made by parties who held mechanics' liens against the building and who leased the quarry to the company. Therefore, it was announced that the equity of the trustee alone would be offered for sale. After a little bidding, it was sold to J. W. Goodhue, of New York, for $4,000. The latter represented Eugene J. Beal, who was an officer of the company and is supposed to have dropped a considerable sum in starting the enterprise. It is believed that further litigation will follow.

Former State Comptroller James A. Roberts, who has been one of the foremost men in the establishment of the Medina sandstone combination, says: "There is no intention to advance the price of the stone. The company has been formed merely to place the stone on the market without adding to the cost of the stone. The supply is limited, but the price will not be advanced. The strip of land in Orleans County is the only place in this State where Medina stone can be quarried. Still the stone will be disposed of at the same rates which have hitherto prevailed."

William Lockhard, one of the wealthiest men in Pittsburg, together with a party of capitalists, have formed a syndicate with $2,000,000 capital for the development of the coal, limestone and fireclay deposits of Lawrence and Butler counties, Pa. Several thousand acres of land have been leased and operations will begin as soon as the necessary legal formalities have been gone through with. The company has purchased all the Slippery Rock territory and is preparing to build a railroad line through the holdings of the company to enable it to take out the limestone and fireclay. All the land of this nature in the western part of Butler County has been placed under lease and all of that lying in the eastern portion of Lawrence County, adjoining the Slippery Rock creek. John S. Wertenbach & Co., of McKeesport, will probably have the contract of stripping the stone and taking out the clay.

All of the Indiana Representatives and Senators have signed a petition to the Secretary of the Treasury asking that Indiana limestone be used in the construction of the new federal building at Indianapolis.

Attorney Louis T. Kurtz, Edwin E. Marshall and M. W. Leslie, of New Castle, and Thomas Black, of Eastbrook, have purchased 150 acres of fine limestone land at Eastbrook, Pa. The Pennsylvania Company has agreed to build a track to the property, and operations are to be begun in the spring.

The American Lithographing Stone Co has been incorporated under the laws of Arizona, with a million shares of stock authorized. The directors are: Charles Neidhart, W. J. Aborn, H. W. Fleming and E. S. Eldridge, Cleveland; E. A. Biery, J. A. Fuller and M. L. Williams, Warren, O.; C. M. Rice and Henry Herbert, Newton Falls, O. The officers are: President, Charles Neidhart; secretary and treasurer, C. M. Rice. This company has 35 mining claims in Otero county, New Mexico, which is underlaid with a fine quality of lithographing stone. The company proposes to develop the claims.

Mrs. David L. Goodrich has sold her quarry at Albion to the new Medina Sandstone Company.

The business of Rightmyer & Shoch, bluestone dealers of Rowlesburg, W. Va., has been dissolved by mutual consent. Mr. J. R. Smoot, of Newburg, W. Va., has bought Mr. Shoch's entire interest, and the latter retires. The business will now rapidly be pushed to the front, as Mr. Smoot is abundantly able to place to its credit the necessary funds to operate it in the most successful way. There will be put into the plant the most up-to-date machinery, such as traveling cranes, saws, planers, rubbing beds, etc. The business will hereafter be known as the Preston Bluestone Company. The new concern should have a lively trade, both in the eastern and western cities, as the quarry is located midway between them, and stone can be landed in New York or Chicago at the same prices.

Messrs. Hale & Brunton, of Denver, Colo., are meeting with great success in the production of Larimer County red sandstone. The firm is made up of Arthur Hale and Thomas T. Brunton, and has offices in the Kittredge Building. The quarries are located five miles due west of Fort Collins in Larimer County, about seventy miles north of Denver, on a spur of the Colorado & Southern Railroad. The firm is at the present time the only one quarrying red sandstone of this kind in the State. A sample of the stone from the Hale & Brunton quarry is now in the office of this magazine. It is one of about 200 which was sawed from the same block, and is said to represent a fair average of the run of the quarry. It bears a very close resemblance to the finest samples of the Corsehill Scotch red stone. It is almost identical in coloring, being the slightest shade lighter, while it is somewhat finer in texture. The color is remarkably uniform, having none of those veins of darker tint so frequently found in Corsehill stone.

The Larimer County stones have been used to a considerable extent in Denver and have contributed much to the architectural beauty of the city. They can always be relied upon to stand the weather. Messrs. Hale & Brunton are now introducing their stone at Missouri River points, where it is meeting with high favor. The red sandstone crops out at several places on the east slope of the mountains between Trinidad and the Wyoming line, but differs greatly in character at different places. At Manitou it makes a "Garden of the Gods," so beautiful in its bewitching color effects that it has inspired the painters and the poets. But it is susceptible to changes in temperature, and the action of the wind and water affect it so as to make it of little use in the habitations of man. The Fort Collins stone, however, is a northern stone and is harder in texture and will withstand the severities of every climate to which it has been subjected. The stone tools finely, is not refractory under the saw and can be obtained in great lengths. It runs in some of the beds a distance of 300 feet without a break. Messrs. Hale & Brunton have a supply of the stone that is practically unlimited. They quarry it in large blocks, using the Sullivan mining drill with steam head for all drilling. Very little powder is employed, as it is possible to cut all round a block with the drill and then break it into smaller sizes with the plug and feather.

The Indiana limestone producers have met again and agreed to maintain prices for the present year. The situation is generally considered satisfactory as to the future stone trade. Considerable new business has developed, and the indications are for the best season in the oolitic belt.

A Tribute to Indiana Limestone.

D. A. Sutherland, of Columbus, Ind., has written a letter to the Indianapolis "Journal," in which he says:

"I have noticed lately a great deal of comment upon the durability of Indiana limestone and the probability of other than the Indiana product being used in the proposed public building to be erected at an early date at Indianapolis. It is natural when an Indianan goes East and sees the fine office and public buildings that he inquire and wonder what kind of material has been used. The writer having just had an opportunity to visit, perhaps, one of the finest and most substantial office buildings in New Jersey and the entire East is able to give some information in favor of the Indiana product. About ten years ago the Prudential Life Insurance Company of America put up a large building in Newark, N. J., and used for exterior purposes Bedford limestone. In the last two years the company has added three additional buildings, and, according to the statement of Charles R. Hedden, builder, nearly 250,000 cubic feet, or 23,000 tons of this Indiana limestone was used. If there had been the remotest question of its durability the company would not have used this stone in the last buildings just erected. I think these magnificent buildings can be cited to prove there is no superior quality of building material anywhere, and the company above referred to would no doubt gladly attest its praise for Indiana limestone."

Stone Trade Notes

The Casparis Stone Co., of Columbia, O., has let contracts for a new and larger plant to replace the one recently burned, with a loss of $50,000.

William Penn & Co., cut stone dealers, of West Superior, deny the report that they will remove their plant to West Duluth, although inducements have been offered them. The company employs thirty-five men, most of them in the large cutting sheds which have just been erected. They are cutting the stone for a large number of buildings, among them the court house at Olivia, Minn., the Carnegie library at Fargo, the high school at Aberdeen, N. D., and the Steel Trust building in Duluth.

The Keystone White Sand Co., operating a sand mill near Hancock Station, Md., has been incorporated, with a capital stock of $50,000.

The East Conshohocken Quarry Company has filed a bill in equity against the owners of the quarry at Conshohocken, Pa., which it leases, asking an injunction against eviction. The company claims that it has made many permanent improvements to the property, and that now the owners seek to evict them in order to relet the property at a higher rental to William Dunn & Co.

Michael J. O'Connor, Ernest Walker and George A. O'Connor, of Hartford, Conn., have incorporated the Windsor Cut Stone Company, of that city, with capital stock of $10,000.

David Hughes, Morgan Evans and J. H. I. Brown have incorporated the Fort Worth, Tex., Electric Stone Mill and Granite Works, with a capital stock of $10,000.

Short & Weathers, proprietors of an artificial stone manufactory at Seymour, Ind., will remove their plant to Paducah, Ky., in the spring.

Little Falls, Minn., will establish a stone crushing plant.

Frederick Snow has been elected president of the Montpelier branch of the Granite Cutters' Union.

There have already been removed from the Rapid Transit subway in New York more than a million cubic yards of stone. There have been used 125,000 cubic yards of concrete, while 375,000 yards are yet to be furnished.

Holland & Conover, of Middleburg, O., together with other parties, have leased the Reams quarry at East Liberty. Modern machinery and a second crusher of the largest size will be installed at once. The new company will burn lime and get out building and crushed stone.

George Hamilton, an old stonecutter and a member of the former firm of Hamilton Bros., of Worcester, Mass., is dead at Fitchburg, at the age of 79 years.

The Youghiogheny Stone Company, of Pittsburg, Pa., has been incorporated, with a capital stock of $1,000.

The firm of Douglass Brothers, contractors in rough and cut stone work, with plant on Twenty-fifth street, south of Dickinson, Philadelphia, Pa., has been dissolved by mutual consent.

Forty employees of Bowker, Torrey & Co., of Boston, have struck because the firm refused to sign an agreement for an eight-hour day. Troy Bros. & Co. and C. E. Hall, of the same city, have signed the agreement.

The Schumacher Building Stone Company, of St. Louis, Mo., has been incorporated, with a capital stock of $130,000. The incorporators are Johannes Schumacher, W. Janisch, and F. H. Lowry.

The Lake Shore Stone Company will erect a stone crushing plant, with a daily capacity of 1,500 yards, at Lake Church, Mich.

About 160 marble workers employed by the Columbian Marble Quarrying Company, of Rutland, struck recently. They informed Mr. Manning, the president, that they had no grievance against him, but that they had been abused by a foreman. The strike was finally settled by the removal of the offending foreman.

James Walker, of Granite, Md., has gone to Salt Lake City to engage in Belgian block making.

James Shearey, a well-known stone dealer of Sewickley, Pa., is dead at the age of 70 years.

The Andres Cut Stone & Construction Company, of Milwaukee, is having plans prepared for a new stone cutting plant and engine house to be erected on Burleigh street.

The marble cutters and setters of Pittsburg have been granted an increase of

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wages from 37½ to 50 cents an hour. The helpers have been advanced from $1.75 to $2.00 for an eight-hour day.

The Deckers Creek Stone & Sand Company, of Morgantown, W. Va., has been incorporated with a capital stock of $22,000. The incorporators are: George C. Sturgiss, J. A. Martin, E. T. Shultz, R. A. Vance and F. P. Corbin, all of Morgantown.

The year opens with promise of labor troubles of serious dimensions in various parts of the country. So far the main disputes have arisen at Quincy and Milford, Mass., at Barre and in the Pennsylvania slate regions. At Quincy the quarrymen have quit work because their demand for an eight-hour day and for weekly instead of monthly payments was not granted. At Milford the demand of the cutters for a new scale has been anticipated by a demand from the Derrickmen's and Hoisting Engineers Unions for higher pay. The Barre Quarrymen's Union, with a membership of between 800 and 900 members, asks for an eight-hour day with nine hours' pay and time and a half for all overtime. The producers say they cannot grant this. In the Pennsylvania slate fields the quarrymen ask for a nine-hour day and the same wages they were receiving for ten hours. The slate makers ask for an increase of 10 cents for each square.

The McWhirter Stone Company is the name of a new concern with offices at 11 North Forsythe street, Atlanta, Ga., and yards at Jones avenue and Marietta street. Robert N. McWhirter, who has been with Ramsey Brisben Stone Company for several years, is head of the new company, which will furnish all kinds of stone, marble and granite for building purposes.

The Morris stone crushing plant, near Dunbar, Pa., was destroyed by fire, entailing a loss of about $30,000.

The Algonite Stone Company, of St. Louis, has been incorporated with $5,000 capital by John R. Wettstein, Charles R. Fife and John P. Neville.

Monumental News

Walworth county, Wis., will vote on a proposition to build a $10,000 soldiers' monument.

A movement is on foot among the Polish and Lithuanian residents of Wilkesbarre, to erect a costly monument in honor of the workmen who were killed at Lattimer, by deputy sheriffs a year or two ago.

The monumental firm of Wallace & Earle, of Malone, N. Y., has been dissolved, and each member will engage in business for himself.

The New Jersey Legislature has been asked to appropriate $1,000 for a monument on the Palisade Bluff, to mark the site of old Fort Lee, of Revolutionary fame. Residents of Fort Lee are subscribing to a fund to add to the appropriation.

A bill is before the New York Legislature appropriating $30,000 for a monument to Alexander Hamilton, in the Capitol Park, at Albany. Gen. Hamilton married a daughter of Gen. Philip Schuyler, of Albany, in 1780, and was afterwards closely identified with that city. As yet not a single bit of statuary adorns the capitol. July 12, 1904, will be the centennial of the death of Hamilton, from Burr's bullet. The anniversary might be the occasion of a suitable memorial in Trinity Church, New York, where he lies buried under an unpretentious monument.

Cincinnati proposes to erect a statue of Lincoln, in Avondale Park.

Oregon expects to erect a monument to her Volunteers, in Portland, costing from $15,000 to $20,000.

Delaware County, Pa., proposes to erect a soldiers' monument, costing $10,000, in the form of a granite shaft, 40 feet high, in the Court House square, at Media.

Thirty-six of the most prominent American artists have signified an intention of submitting designs for the $250,000 memorial to General Grant, to be erected in Washington. The commission having the matter in charge consists of General G. M. Dodge, Senator George P. Wetmore and Secretary of War Root.

The citizens of Richmond, Va., propose to erect a monument to the late Dr. Hunter McGuire, in Capitol Square.

The city of Raleigh, N. C., has begun to push, vigorously, the collection of funds for a statue of Sir Walter Raleigh.

The citizens of Fort Ann, N. Y., are talking of erecting a monument to mark the Revolutionary battle that took place there. In former years a simple monument stood on the battlefield, but it was destroyed by boys.

A bill is before the New Jersey Legislature appropriating $20,000 for an equestrian statue of the late General Sewell, on the State House grounds.

The ways and means committee of the Maryland House of Representatives, will report in favor of an appropriation of $3,000 for a monument to the heroes of the War of 1812, on the battlefield, at North Point.

Twenty-nine artists will submit designs for the $60,000 statue of General McClellan, to be erected in Washington.

The cost of the Tenth Regiment memorial and the monument to Col. A. L. Hawkins, to be erected in Schenley Park, Pittsburgh, has been limited to $20,000.

A bill is before the Michigan legislature appropriating $10,000 for a monument at Monroe to commemorate the battle of Raisin River, fought in 1813.

The Caledonian Society, of Toronto, Ont., is to erect a $6,000 Burns monument in Allan Gardens in that city.

Appomattox County, Va., proposes to erect a Confederate monument in the court house square at Spanish Oak.

New Paltz, N. Y., has nearly a thousand dollars on hand for a Huguenot monument.

A bill has been favorably reported in the United States Senate, appropriating $10,000 for a monument to Dorothea L. Dix, the Civil War nurse, at her birthplace, Hampden, Me.

The Maryland Senate has passed a bill appropriating $3,000 for a life-sized bust of Admiral Schley.

Clermont, Ia., is raising a fund for a soldiers' monument. Local sentiment favors a life-size statue of Lincoln.

Subscriptions are being invited for a soldiers' monument at Middle Spring, Pa. The Middle Spring Presbyterian church sent out more men to the Colonial, Revolutionary and War of 1812 than any church in the United States.

Indiana has awarded the contract for twenty-one monuments which the State will erect on the Shiloh battlefield to the Muldoon Monument Company of Louisville, Ky. The monuments will be of Indiana limestone and will cost $1,000 each. They

will all be alike to avoid any claim of discrimination. They will stand sixteen feet high, mounted on a base eight feet two inches square. On the sides of the monuments for the infantry will be the name of the regiment, the State's seal, and below this will be the crossed muskets, cartridge box, canteen, etc. On the artillery monuments the work on the sides will be similar, but in place of the crossed muskets there will be crossed cannon.

A bill is before Congress appropriating $50,000 for a monument at Fredericksburg, Va., to Gen. Hugh Mercer of the French and Indian and Revolutionary Wars, who suggested the night march on Princeton and was killed in the battle that ensued.

Milwaukee has $3,500 on hand for a Kosciusko monument.

Congress is asked to purchase Crab Island, at Plattsburg, N. Y., for a national military park and to erect a monument to the heroes of the battle of Plattsburg.

Friends of Billy Rice, the famous minstrel, are trying to raise $5,000 for a monument over his grave.

Although Iowa has refused to appropriate $35,000 for monuments at Lookout Mountain, the legislature will probably give a smaller sum for the purpose.

The Illinois auxiliary of the McKinley Memorial Association has already raised $33,063.12 towards a national memorial to the martyred President.

Forty plans and seven models have been submitted for the soldiers' monument which is to be erected in Philadelphia at a cost of $500,000. The successful design will win a prize of $1,000.

Nashville, Tenn., proposes to erect a costly monument to James Robertson, the first settler on the banks of the Cumberland where that city now stands.

Efforts are being made in Philadelphia to rear a monument to Matthias Baldwin, inventor, and the manufacturer of the locomotives that bear his name.

The Confederate monument which is to be erected on the State Capitol grounds at Austin, Tex., will be surmounted by a statue of Jefferson Davis, while four other statues will represent the different branches of the service.

The Boonesborough, Ky., Chapter of the Daughters of the American Revolution will erect a $1,000 monument at that place.

Governor Franklin Murphy, of New Jersey, is president of the Princeton Battle Monument Association, and Hon. Grover Cleveland is one of the vice-presidents.

A monument costing $5,000, to be paid for by the State of Pennsylvania, will be erected at Ephrata, to mark the burial place of 200 Revolutionary soldiers who died at the Mount Zion cloister of the Seventh Day Dunkers after the battle of Brandywine. The monument will be a shaft of granite thirty-one feet high, and it will be erected on foundations built more than half a century ago.

William H. West, the well-known minstrel, set aside the sum of $5,000 in his will for a monument in Greenwood cemetery.

Watkins, N. Y., expects to erect a monument to Floyd J. Shoemaker, of the Ninth U. S. Infantry, who was killed in the Philippines.

An American's Prophecy as to Truro Cathedral.

A short time ago a note was printed in these columns to the effect that great fears were entertained as to the stability of Truro Cathedral in Cornwall. Signs of fracture were discovered in eight of the Bathstone bases of the nave piers and to replace these would require a costly and perhaps dangerous process for underpinning the arcades. That this disaster was foreseen by a shrewd man who is now a resident of this country is proved by a letter from "A Practical Man" that appears in the "West Briton and Cornwall Advertiser." The writer says: "Let us hope that coming events do not always cast their shadows before them. When my lifelong friend, Mr. Henry Cane, was for some time clerk of works over Truro Cathedral, he prophesied darkly the all too early fate of the building. He roundly asserted the late Mr. Pearson had altogether miscalculated the weight and strain the stone used in the construction would carry, and stated his belief that in less than fifty years the whole edifice would be all down with a run. Mr. Cane was for a great number of years one of the most trusty of the late Sir G. Gilbert Scott's clerk of works, and under that past master of his crafts superintended the erection of some of the most important buildings in the kingdom. He was also for a number of years the resident clerk of works of York Cathedral. He has now well advanced in years, retired from the craft, and is resident at North Yamhill, Oregon, U. S. A., and would, I am sure, verify this statement."

The oil stone works at Jeffersonville, Ind., which have been idle for some time, have been leased by the owner, Julius Louis, to a New York party, and will resume operations at once.

Frank Frantz and John Walter are opening a new slate quarry on land they have leased at Slatedale, Pa.

Parsons Bros. are planning the erection of a large factory at the Golden Rule quarry, Pen Argyl, for the use of the Pen Argyl Blackboard factory.

The heavy rains have caused considerable damage in the different slate regions. The floods brought down much top and side, and the pumps, taxed to their utmost capacity, could not keep the quarries clear.

A number of Boston and Bangor men have purchased the slate quarry at North Blanchard, near the extensive quarry operated by the State of Maine slate company, and will open the quarry in the spring. R. C. Penney, of Bangor, formerly superintendent of the Monson Slate Company, will manage the business of the new company.

It is reported that E. J. Johnson, operating the Grand Central quarries, at Pen Argyl, will discontinue the manufacture of blackboards and give all his attention to the production of roofing slate.

The Slate Trade

It is said that the State of Maine quarry at North Blanchard, which has been shut down for some time, will be started up this spring.

The Capital Slate Company, operating quarries at Northfield, Vt., will install additional machinery. The reports made at the annual meeting were gratifying to the stockholders.

F. J. Wilkins has begun work clearing up ready for production at the Forest quarry, which he recently leased from the Monson Maine Slate Company. W. E. Jones, who leased the Oakland quarry from the same company, will begin work in the spring.

The Cambria Slate Company, a Pennsylvania concern, has been incorporated under the laws of New Jersey, with a capital stock of $100,000.

The Hyatt School Slate Company, whose large factory at Bangor, Pa., was recently burned, has rented a factory at Slatington and begun operations. It is reported that the company will erect a large plant at the latter place.

The new company which has leased the West Albion quarry at Pen Argyl has a large force of men at work removing top. Large pieces of top will be taken off at three sides, and the quarry enlarged to several times its present size. Two new hoists are to be installed. The factory at present occupied by the Pen Argyl Blackboard Company will be equipped with additional machinery and used for the manufacture of mill stock.

It is a common remark among the Pennsylvania slate operators that they have enough orders on their books at the present time to last for three years. It is said that jobbers stand ready to contract for the entire output of the best quarries. A gentleman who is familiar with the slate industry in this section recently made the following statement to a correspondent: "The best way to meet the demand is to develop the Pennsylvania slate region as economically and systematically as possible. An examination of the Northampton County slate ranges shows an enormous amount of untouched slate rock and especially at Danielsville, where the slate beds are larger than in any other part of Pennsylvania. Meanwhile something should be done to render these resources available. A noticeable feature of the slate quarry enterprise in the Pennsylvania slate region is the number of private owners of quarries. The trade has been built up and made what it is, for the most part, by men of high standing, of intelligence and capacity for business, and of indomitable energy also, who have not been above superintending their own quarries, having first mastered the details. They deserve all the success they have gained, and no one need envy them the enjoyment of their princely incomes. They and, perhaps more than themselves, their fathers before them, have had their difficulties, their times of great fear and depression, but they worked on, seeing the ascent from behind the horizon of their struggles, of the first faint rays of the rising sun of their prosperity. Slate enterprises are as fair and promising a field for joint stock enterprises as any other, better than gold mines in far off regions, but they offer special inducements to young men of vigor and intelligence, who either singly or jointly are possessed of the necessary means, and who would be willing to mind their own business. To them it offers the profitable employment of their time and money, giving to them all the charms of an outdoor life and a good position among their fellowmen."

Determined efforts are being made to bring about a combination on a large scale in the Peach Bottom region. So far nothing definite has been done, although slate lands are largely sought. One of the most complete plants in the section is that of the York and Peach Bottom Slate Mfg. Co., which is wholly operated by electric power. A sale of what is known as the W. Scott Whiteford tract, has been made, and negotiations are in progress for other properties. The slate vein extends about ten miles in a northeast and southwest direction, and to an unknown depth, but only a small portion has been mined. Instead of 500 employed there is room for 5,000.

General William H. Hughes has leased a portion of the Whiting farm in Granville, N. Y., adjoining his present slate lands. This gives him sufficient slate rock to last half a century.

Limes and Cements

The Powhattan Lime Company has been incorporated at Richmond, Virginia, with a capital of $25,000, to quarry limestone and manufacture lime. The officers are: Warner Moore, president and treasurer; Richard McCoy, vice-president and general manager; William H. Addison, secretary.

A gentleman who is supposed to be in touch with the cement interests of Clark County, Ind., says: The Louisville Cement Company and the Union Cement and Lime Company, the larger manufacturers, the Ohio Valley and the United States companies, all in the vicinity of Sellersburg, and the Standard at Charlestown, will operate their plants this season. The Globe, Golden Rule, K. and I., New Albany, Hoosier and Charlestown mills will lie idle.

The Carbon Plaster Company, of Fort Dodge, Iowa, has transferred its plant to the United States Gypsum Company.

The Thorn-Halliwell Cement Company, of Kansas City, Mo., has been succeeded by the Halliwell Cement Company, of which Walter S. Halliwell is sole owner.

The Union Cement & Lime Company, of Louisville, has sold 296 acres of land at Hamer Hollow and Hixon, near Mitchell, Ind., to the Lehigh Portland Cement Company for $6,000. The tract contains an inexhaustible supply of stone and there is an abundance of water.

The Keystone Plaster Company will shortly begin the erection of several additions to its large plant at Chester, Pa. There will be a three story brick addition to the main building 50 x 68 feet, a mammoth rock house, 50 feet high and 210 x 240 feet. The addition to the main building will be equipped with crushing, grinding and calcining machinery which will double the capacity of the plant. Since the company has located at Chester, its business has increased extensively. The importation of rock from Egypt, Pa., which is used in making the company's product, has grown from 5,000 to 35,000 tons a year.

The directors and stockholders of the Chewacla Lime Company, of Opelika, have decided to sell the plant and all of the property of the company. It controls over 8,000 acres of good farming land.

The purchase of the New York & Rosendale Cement Company by the Consolidated Rosendale Cement Company, which was incorporated in January with a capital of $1,500,000, has already led to litigation. The Consolidated Company controls the old Delaware and Hudson Canal, and the rate of toll has always been 3 1-5 cents per barrel from Lefever Falls to Eddyville, which is practically 4 cents a mile. The Consolidated Company has notified the New York Cement Company that hereafter the rate will be 16 cents a barrel. The latter company has, therefore, taken legal proceedings to restrain the Consolidated Rosendale Cement Company and J. Graham Rose and Ralph Burger from exacting and collecting exorbitant tolls on the canal. The New York company sent a boatload of cement and tendered payment at the rate of 4 cents a mile. This was refused and 16 cents per barrel was demanded. This action forms the basis of the suit. The New York Cement Company claims that it has orders for 150,000 barrels of cement in New York City, and that this raise in toll will make it impossible to get it to market except at a great loss, as there is no way of transportation except by the Wallkill Valley Railroad and to reach that the cement would have to be carted some distance.

The Wakefield Mills & Lime Company, of Carroll County, Md., has been incorporated at Westminster, with capital stock of $50,000, by William B. Thomas, Elias O. Grime, W. Frank Thomas, E. Oliver Grime, Jr., John H. Cunningham, Oscar D. Gilbert and Joseph W. Smith, all of Westminster. The charter of the company is one of the broadest ever granted in the State, empowering it to do almost everything from quarrying limestone to making butter and cheese and manufacturing flour.

The United States Artificial Marble Company, of Jersey City, has been incorporated with a capital stock of $500,000. Incorporators: C. C. Fite, J. H. Kugler, P. W. Ryder.

Frank Lorimer, of St. Cloud, Minn., will engage in the manufacture of artificial stone at Minneapolis.

The Herring Artificial Stone Company, in which J. C. Herring is the principal figure, has begun business at Charlotte, N. C.

Contracts and Building

Government Work.

Norfolk, Va.—Congress will be asked to build a half million dollar storehouse here.

Springfield, Ill.—The Federal Building will be enlarged and rebuilt at a total cost of about $150,000.

Washington, D. C.—The estimated cost of the proposed buildings for the Department of State and the Department of Justice is $5,400,000. The building will be of white marble after a classical design.

West Point, N. Y.—The plans for the rebuilding and improving of the Military School prepared by a committee of military experts, contemplates an expenditure of $4,500,000.

Yazoo City, Miss.—This place is to have a new post office building.

State, County and City Buildings, Hospitals, etc.

Alexandria, Ind.—The city will build a $25,000 city hall.

Bradford, Pa.—A city hall to cost $25,000 will be erected here.

Buffalo, N. Y.—A new armory for the Sixty-fifth Regiment will be erected at North Masten and Best streets. The State appropriation is $650,000.

Dallas, Texas.—A crematory plant will be erected here.

Fernandina, Fla.—The city will vote on issuing $75,000 bonds for constructing a sewerage system, building city offices and enlarging the electric light plant.

Lisbon, Ohio.—A vote will be taken on the erection of a city hall.

Lufkin, Texas.—A brick house to cost $40,000 will be erected here.

New York, N. Y.—The New York Ophthalmic and Aural Institute expect to erect a new hospital building at Central Park West and Sixty-fourth street. The present institution is now on East Twelfth street.

Rolling Fork, Tenn.—A new court house is to be erected here.

St. Joseph, Mich.—A city hall to cost $30,000 will be erected after plans by Starr & Sparrel.

Springfield, Ohio.—The city will vote on a proposition to issue $40,000 bonds for a hospital.

Churches, Convents and Synagogues.

Atlanta, Ga.—St. Mark's Methodist Congregation will build a $35,000 church after plans by Bruce & Morgan.

Augusta, Ga.—The First Baptist congregation will build a $50,000 church.

Braddock, Pa.—The Sacred Heart Catholic congregation (Polish) will erect a $30,000 church.

Buffalo, N. Y.—The Church of Notre Dame de Lourdes will build a parish school on Main street.

Chicago, Ill.—The Metropolitan Church of Christ will build a five story church with roof garden and gymnasium. Rev. Charles R. Scoville, pastor.

Cleveland, Ohio.—St. Joseph's Roman Catholic congregation will erect a church and school at Raus avenue and Fleet street.

Freeport, Pa.—The United Presbyterians will erect a brick and stone church.

Jackson, Miss.—St. Andrew's Episcopal congregation will erect a Gothic church on Capitol street costing $30,000. Plans by W. P. Weathers.

Lockport, N. Y.—A Y. M. C. A. building, costing about $35,000, will be erected here.

Marion, Ind.—The Y. M. C. A. will build a $25,000 building here.

Oil City, Pa.—The Y. M. C. A. have purchased a site and will erect a new building at a total cost of $100,000. Ed Welker, president.

Pittsburg, Pa.—The Gibbons Club, connected with the Holy Cross Catholic Church, will erect a $20,000 club house.

Pottsville, Pa.—The M. E. congregation will build an $80,000 church here.

Rantoul, Ill.—The First Baptist congregation will erect a brick and stone church here after plans by E. S. Hall, of Chicago.

Roanoke, Va.—The Railroad Y. M. C. A. will erect a $30,000 building here.

St. Joseph, Mich.—The Congregational Society will erect a brick and stone church after plans by Starr & Sparrel.

San Antonio, Texas.—The Baptist congregation will erect a $30,000 building on Taylor street.

Schools, Colleges and Libraries.

Allentown, Pa.—Very extensive improvements will be made to the buildings of Muhlenberg College.

Birmingham, Ala.—The Birmingham Medical College will erect a stone and brick structure at Avenue F and Twentieth street.

Booker City, Ala.—A new college for negroes will be erected here.

Bowling Green, Ohio.—A new school building, costing $35,000, will be erected here.

Charleston, W. Va.—Plans are being prepared for a new high school building.

Chicago, Ill.—The Jewish Manual Training School will erect a $25,000 workshop.

Cleveland, Ohio.—The Case School of Applied Science will erect a mining building to cost $100,000. Additions and extensions to the city high schools are contemplated, at a total cost of $275,000.

Coudersport, Pa.—A $25,000 high school building will be erected here.

Dowagiac, Mich.—A high school building will be erected here.

Flint, Mich.—A brick and stone school will be erected on Hazelton street after plans by Clark & Munger, of Bay City.

Holland, Mich.—Hope College will erect a $25,000 scientific building.

Huntsville, Ala.—Architect Cowell has been directed to draw plans for a $20,000 public school.

Kokomo, Ind.—Andrew Carnegie has given the city $25,000 for a public library.

Lancaster, Pa.—A high school costing $40,000 will be erected here after plans by Joseph Blaby, of Palmyra, N. Y.

Milford, Texas.—The Texas Presbyterian College for Girls will erect a main building and music hall.

Montgomery, Ala.—The bids on the new Carnegie library to cost $50,000 were all too high and the building is being refigured.

New Haven, Conn.—Yale College will erect a new building, costing $150,000, for offices of the dean and the academic department.

Rand, Ga.—Plans are being prepared for a $20,000 building at Shorter College.

Rochester, N. Y.—A school building to cost $50,000 will be erected here.

Seymour, Texas.—The town will erect a handsome new school building.

Zanesville, Ohio.—The city is discussing the erection of a $100,000 school building.

Washington, D. C.—The Dominican Fathers will erect a large building in this city and abandon their school at Somerville, Ohio.

Business Buildings, Theatres, Hotels, Society Halls, Etc.

Ann Arbor, Mich.—The State Savings Bank will erect a three story banking building after plans by Spier & Rohns.

Anniston, Ala.—A new company has been incorporated to build a modern five story hotel at the corner of Noble and Twelfth streets.

Birmingham, Ala.—The Title Guarantee and Investment Company will build a nine story office building costing $160,000, on Third avenue and Twenty-first street.

Birmingham, Ala.—Plans are being prepared for a $50,000 athletic club building.

Brookline, Mass.—The Beacon Boulevard Hotel Trust Company will erect a ten story apartment hotel here at a cost of $650,000, after plans by C. H. Blackall, of Boston.

Brooklyn, N. Y.—An extensive addition to the Brooklyn Eagle Building will be erected soon. It will be of brick with sandstone trimmings.

Buffalo, N. Y.—The Snow Steam Pump Company will erect an addition to its plant, costing $125,000.

Chicago, Ill.—The Chicago Title and Trust Company will erect a sixteen story annex costing $700,000, after plans by Henry Ives Cobb. Rand, McNally & Co., are planning the erection of a $1,000,000 building.

Columbus, Ohio.—The Morgan Engineering and Construction Company will erect a plant here for the manufacture of overhead traveling cranes. The plant will cover ten acres.

The Jeffrey Manufacturing Company are erecting a new $10,000 building at their plant.

The Empire Theatre, costing $75,000 will be erected at Gay and Pearl streets. George C. Urlin.

Easton, Pa.—The First National Bank will erect a brick and stone building.

Elwood, Ind.—A project is on foot to erect a $50,000 hotel here.

Fort Wayne, Ind.—A $100,000 beet sugar factory will be erected here.

Griffin, Ga.—Messrs. Boyd & Mangham will erect a $125,000 cotton mill here.

Huntsville, Ala.—The Elks will erect a $25,000 opera house.

Hamilton, Ohio.—New buildings will be erected here the coming spring and summer at a total cost of more than $2,000,000. These include buildings ranging in price from $150,000 to $1,000,000 for the Champion Coated Paper Company, Beckett Paper Company, Hooven, Owens & Rent-


A LESCHEN & SONS ROPE Co.
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BRANCH OFFICES:
92 CENTRE ST.,
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95 FREMONT ST.,
SAN FRANCISCO, CAL.
LESCHEN CO'S WIRE ROPE
LESCHEN CO'S TRAMWAY

schier Company and the Black & Clawson Company.

Knoxville, Tenn.—The Knoxville Iron Company will build a $100,000 plant.

Meadville, Pa.—A project is being considered for the erection of a four story brick and stone hotel to cost $250,000.

New York, N. Y.—A new sky-scraper is to be erected on lower Broadway by a syndicate headed by S. H. G. Steward. Henry Ives Cobb is preparing plans for a twenty-story office building to be put up at 36 Broadway.

A seventeen story addition will be built at the Imperial Hotel at a cost of $430,000, after plans by Warren, Whitmore & Morgan.

Niagara Falls, N. Y.—Mrs. James Hays will erect a block of brick and stone flats to cost $60,000.

Norfolk, Va.—The Norfolk National Bank will erect a ten story building at Granby and Plume streets.

Oak Park, Ill.—A project is on foot for the erection of a $75,000 theatre here. Frank H. June.

Pittsburg, Pa.—Henry Phipps will erect a $500,000 hotel for working people, after plans by H. B. Naylor.

B. F. Keith will erect a theatre here, which with its site, will cost $1,000,000.

Westinghouse Machine Company will erect a pattern shop and gray iron factory at Trafford Park, costing with equipments over $1,000,000.

Rochester, N. Y.—The contract for the exterior marble work on the Masonic Temple here has been awarded to Lauer & Hageman for $15,000, and for the interior marble work to J. P. Weston, at $10,300.

San Antonio, Texas.—Berliner & Sims will erect a business building at Houston and Navarro streets at a cost of $40,000.

San Francisco, Cal.—A new hotel in the Italian renaissance style will be erected on the summit of Nob Hill, at a cost of $2,000,000 by the heirs of Senator Fair. The exterior will be of light stone or of terra cotta.

Sault Ste. Marie, Mich.—V. E. Metzger will erect a store building on Ashman street, after plans by Architect Teague. George Kempe will build a stone store building and warehouse after plans by the same architect.

Shousetown, Pa.—The U. S. Wire and Nail Company, of Pittsburg, is having plans made for a $500,000 billet mill here.

Utica, N. Y.—The Utica National Bank will erect a new banking building on Genesee street.

Bridges, Depots and Railroad Works.

Atlanta, Ga.—A viaduct will be built over the railroad tracks at Peters street, with a total length, including approaches, of 1,000 feet. R. M. Clayton, City Engineer. Cost, $50,000.

The city is discussing a viaduct on Peters street over the railroad tracks at an estimated cost of $50,000.

Augusta, Ga.—The plans of F. P. Milburn have been accepted for the Union passenger station here.

Bloomington, Ill.—A Union depot for the Big Four and the Lake Erie and Western will be built here.

Chicago, Ill.—The council has passed ordinances for the elevation of the railroad tracks on Kinzie street. This will necessitate a number of subways. The council also requires the elevation of the tracks running into the Union stock yards covering thirty miles of trackage and the building of thirty-four subways. Chief Engineer Randolph, of the Sanitary District, of Chicago, reports that twenty-eight bridges in all are to be built over the drainage canal.

Denver, Colo.—An estimate made by Engineer William D. Jones for a 5,000 foot viaduct from Seventh to Curtis streets is $610,000.

El Paso, Texas.—A bill is before Congress to permit the erection of a $2,000,000 dam across the Rio Grande here. W. N. Follett, engineer.

Elwood, Kansas.—The Chicago, Rock Island and Pacific will build a twenty stall round house here.

Fort William, Manitoba.—Plans are being made for an addition to the Canadian Pacific elevator here that will almost double its capacity.

Geneva, N. Y.—The New York Central is considering the erection of a brick and stone depot here to cost $30,000.

Gray's Point, Mo.—Work has been begun on the bridge across the Mississippi River near this place. The plans call for about 600 feet of concrete arches on the west approach and 500 on the east approach.

Hartford, Conn.—An estimated cost of $1,600,000 is given for the contemplated stone arch bridge over the Connecticut River here.

Hoosick Falls, N. Y.—The Boston and Maine Railroad will build a new station here.

Indianapolis, Ind.—Either a stone arch or a concrete bridge will be built over White River at West Washington street,

at an estimated cost of $150,000. J. B. Nelson, city engineer.

The Big Four is expected to build a large freight depot on Jackson street.

Kankakee, Ill.—The Illinois Central Railroad has completed surveys for a concrete bridge over the Kankakee River.

Lawrence, Mass.—A viaduct will be built on Essex street to do away with grade crossings, at an estimated cost of $500,000.

Lexington, Ky.—The Lexington and Erie will build a new depot here.

Newcastle Junction, Pa.—The Pittsburg and Lake Erie will erect a new passenger station here.

Omaha, Neb.—A viaduct over the railroad tracks on Twenty-fourth street is proposed. It will be 1,022 feet long and cost about $100,000.

Paris, Tenn.—The Nashville, Chattanooga and St. Louis are having plans prepared for a new station here.

Pensacola, Fla.—The Louisville and Nashville will, it is reported, erect a car building plant here.

Picton, Ont.—The Central Ontario Railway are building a new passenger and freight station here.

St. Paul, Minn.—The Chicago, St. Paul, Minneapolis and Omaha will build a $50,000 freight house here.

San Rafael, Col.—Concrete bridges will be built on Colloden and Belle avenues.

Schenectady, N. Y.—The estimated cost of doing away with grade crossings here is $864,000.

Springfield, Ohio.—The Big Four Railroad will make various improvements here at a cost of $500,000, including a $75,000 passenger station. The erection of a $60,000 county building here will be voted on this spring.

Woonsocket, R. I.—Plans to widen Globe street call for the building of a 70 foot stone arch in place of the present 40 foot arch.

Barytes in North Carolina.

The mining, treating and shipping of barytes—a rare and comparatively unknown mineral—constitute a new industry for this (Madison) county, says the Charlotte (N. C.) "Observer." There are two large plants in the county and the rock is being taken out from four veins or deposits in different localities. One establishment is located at Hot Springs, and has been in operation for several years; the other is operating on Walnut Creek, two miles west of the village, and is temporarily utilizing a huge old grist mill for grinding the stone. A mill house, 150 x 50 feet, is almost finished and in it already is installed a fifty horsepower engine to run the plant. The product brings on the New York market $14 to $16 per ton for the best grades.

Peculiar Decay of Stone.

The city of Glasgow, Scotland, is much exercised over the extensive decay of stone in the municipal buildings, erected not many years ago at a cost of more than $2,500,000. The cause of the decay is a mystery, and seems to have been a genuine surprise to everybody concerned, but there can be no doubt that it has set in very extensively. The costly carving and sculpture work has been affected to an alarming degree. Repairs are now being made.

The stone of which the City Chambers were built came from the Bannockburn quarries, considered to be the best in the country, but we understand that the particular quarries from which the stone was taken were newly opened. As a preliminary measure it was stipulated that the material should lie for a year in the builders' yard for the very purpose of testing its durability. The puzzling thing is that, although it seems to have stood the test, the municipal buildings have decayed faster than any other building of a similar character in Glasgow. Reference has been made to the deleterious action of the Glasgow atmosphere, but the fact remains that within a stone-throw of the City Chambers there are far older buildings still in a good state of preservation.

When the decaying process was discovered, the advice of various experts was taken, and we understand that a full report was furnished to the city engineer, and through him to the Committee on the Municipal Buildings, by Mr. Alexander Muir, of Alexander Muir & Sons, who are the contractors for the repairs at present in progress. It was at one time proposed to cut out whole capitals of pilasters, but, acting on the recommendation of Mr. Muir, who is probably the oldest and most experienced stonemason and builder in the city, the committee decided to have the decayed portions cut away and a silicate solution applied for purposes of preservation. In this way £600 has already been spent on the east facade of the buildings alone—that is, facing John street. Considerable reticence is shown in the matter. It seems that stonework exposed to the east and north is more liable to decay than that of the south and west. In the experience of builders it is not an uncommon thing for stone taken from the same quarries to vary in respect of durability.

Trade Notes

The Clayton Air Compressor Works, one of the oldest and best-known concerns in the country manufacturing air compressors for all purposes, has reorganized the company. In connection with this action the company has sent out the following notice: "The Clayton Air Compressor Works have noticed in several papers a statement made that would lead their customers to infer that they had sold out and gone out of business. This statement was not in any way authorized and should not have been published, as it is misleading in every way. The Clayton Air Compressor Works have made no changes that will in any way alter their business relations with their various customers. With new capital they are enlarging their works, increasing their patterns, sizes and styles and expect not only to serve their customers better than in the past, but to give them an advantage in the way of prices on improved machinery and new designs." The Clayton compressors have always enjoyed a high reputation among stone men, who will be glad to learn of the increased facilities of the company.

The Iroquois Machine Co. has just been incorporated as a New York company, having been organized by Mr. W. W. Gibbs, who is also vice-president of the Kidder Press Co. and a member of Gibbs-Brower Co. of New York City. The officers are Edwin A. Smith, president, who is a prominent banker in Providence, R. I.; W. W. Gibbs, vice-president and general manager, New York; Henry C. Babcock, secretary and treasurer, Providence, R. I. Principal office, 150 Nassau street, New York. The company will manufacture new and improved wire drawing machinery, which they claim will materially reduce the cost of producing wire. They will also manufacture a full line of automatic and plain drop hammers, swaging machines, rolling mills, roller bearings and grinding machines. Having ample capital, they have purchased the plant and business of the Universal Machine Co., located at Providence, and rented a large additional building adjacent to the same. The purchase of this running plant, and the addition named, will insure to their customers prompt filling of their orders. They will erect a new factory building during the coming summer.

Mr. Reuben C. Hallett, who has a large circle of friends throughout the country, has accepted a position with the Chicago Pneumatic Tool Company's eastern sales department.

The New Albany Manufacturing Company of New Albany, Ind., have issued the sixth annual edition of their daily memorandum calendar. This contains one leaf to each week, with space for noting future obligations and appointments. The New Albany Manufacturing Company makes all kinds of stone machinery and does general foundry work in brass or iron. Quarries in all parts of the country are equipped with steam and electric traveling cranes, heavy hoists, single and double platen planers, Merriman screw feed gangs, rubbing beds, Knobel wire rip raws and like appliances made by this concern.

Considerable attention was given in the technical press to the appliance for coaling ships at sea, invented by Mr. Spencer Miller, of New York, and made by the Lidgerwood Manufacturing Company. This has been most successfully tested by the United States Navy Department, and a recent test has been given by the British Navy. The "Trafalgar," port guardship at Portsmouth, was equipped with the appliance and coaled from the "Muriel" collier. The two ships were 350 feet apart and the test lasted nearly three hours. During this time an average of 30.8 tons of coal were transferred from the collier to the battleship. The quickest run from one to the other was made in 47 seconds, which would be an average of 46 tons an hour. It is believed that with further experience this rate of coaling at sea can be maintained.

The most interesting recent developments on the Witwatersrand have been in connection with the deep borings on the Turf Club grounds near Johannesburg. A recent issue of South Africa says: "In our issue of August 10 last year, we recorded the striking of the main reef series by a diamond drill at a depth of 4,825 feet, and gave many interesting details. In the second borehole to the west the main reef was subsequently encountered at a depth of 4,842 feet, thus confirming the conclusion based on the success in the first borehole, that the whole formation continues to a depth far beyond that calculated upon till the diamond drill ended the controversy. After striking the reef in this second borehole the work was continued to a depth of 5,083 feet, doubtless with the object of comparing the formation underlying the main reef series at this point

with that cut into by the No. 1 borehole. The work, after proceeding for 10 months, has now been stopped, and it is interesting to note the rate of progress made. In this second borehole the drilling was carried out at the rate of 508 feet per month; in the first it averaged 470 feet, and in the Bezuidenville 406 feet. We illustrated our article last year with a photograph of the Sullivan drill used by the Chester Diamond Drilling Company at the first borehole. The success attendant on this borehole is likely to have a large effect on extending the gold-mining area of the Rand; for doubtless the possibility of getting the reef at such a distance from the outcrop will give a great stimulus to similar enterprises far away from the center of the industry. Especially will this be the case to the eastward of the Rand, where prospectors are already very busy; and the good results achieved by such boreholes as have already been sunk have led to the eager acquisition for mining purposes of claims situated at long distance from the outcrop. Deep boring in all directions promises to be one of the most striking features of the revival of the Transvaal gold industry, and the results achieved will be keenly watched not only by those with a monetary interest in them, but by geologists with varying theories as to the nature, extent, and possibilities of the Rand formation."

Mr. Michael Cohen, who has been employed by a leading stone company of this city for a number of years, has opened an office for himself at 1133 Broadway, New York. Mr. Cohen is the Eastern representative of the Chicago and Bloomington Stone Company, selling mill blocks and sawed Bedford limestone. Mr. Cohen also deals in Longmeadow sandstone, Wyoming and other bluestones, broken and dimension stone, granite and marble. He also handles bort and diamonds for drilling and sawing stones. During his many years in the stone business Mr. Cohen made many friends in the trade, who will wish him every success in his new venture.

Artistic Architectural Stone-Carving.

There has recently been completed over the entrance of the Union Trust Company's new building in Providence, R. I., a carved spandrel in marble that is one of the finest examples of architectural stone work in the country. The striking ornamentation typifies those personages and ideas toward which New Englanders will always retain mingled feelings of awe, reverence and love, says the Providence "Journal." There is the stern-visaged Indian, almost nude, a superb type of his race. On the other end of the spandrel the two figures separated by ornamental scroll work, reclines the form of a Puritan Father. In his right hand is an open book; the left hand is raised as if gesticulating; the face is stern and calm, though not entirely devoid of kindly expression. A glance at the sculptor's design conveys the idea of the long ago. The two figures are sharp in contrast; taken singly or together they possess a wonderful fascination. The spandrel is carved from Tennessee marble.

Daniel Chester French—perhaps the greatest living American sculptor—designed the spandrel, and the carving was acomplished by Julius Peccirilli, of the firm of Peccirilli Brothers, of New York. It is considered fortunate that Providence now has such a fine example of Mr. French's work. It was he who designed the famous statue of the "Minute Man," which was erected at Concord in 1875. For ten years Mr. French studied abroad with Thomas Ball at Florence. Returning to this country he first settled in Concord, but afterwards removed to Boston, where he met with conspicuous success. Among his early works are the John Harvard statue in Cambridge and groups in Boston, St. Louis and Philadelphia. In 1887 he went to Paris for a year, and, returning, took up his residence in New York. A few of his later achievements are "Dr. Gallaudet and His First Deaf Mute Pupil" (1888); "Lewis Cass" (1887, now in the Capitol at Washington); "Thomas Starr King;" "Death and the Young Sculptor" (the Millmore memorial, 1891), for which he gained a medal of the third class in the Paris Salon, and the colossal "Statue of the Republic" for the Chicago World's Fair.

The Peccirillis have designed and executed some of the most celebrated American statuary. Recently they were chosen to design the Maine memorial monument, which is to be erected in Long Acre Square, New York. There were forty-eight competitors for this prize. The brothers made the twenty-two figures in the Appellate Court House, New York, the McDonald (New Orleans) monument, and did conspicuous work on the main staircase of the Congressional Library, the Washington Arch, the Connecticut State House and many other public buildings and statues.

Book Reviews.

EIGHTH ANNUAL REPORT OF THE COMMISSIONER OF PUBLIC ROADS OF NEW JERSEY, FOR YEAR ENDING OCTOBER 31, 1901. Henry I. Budd, Commissioner, Trenton: John L. Murphy Publishing Company.

New Jersey and Massachusetts have probably done more than any other commonwealth to advance the cause of highway improvement. Under the State Aid system, New Jersey has constructed 641 miles of public roads, all of them a portion of a general system which will eventually form a connecting net-work throughout the entire State. During the year covered by the present report there was built in all of the counties a total of 109.376 miles. How thoroughly the citizens appreciate the State Aid system is shown by the fact that there are now on file petitions for 423.98 miles of road. Commissioner Budd takes up in detail the different section of roads that were built, most of them being of stone. A few of the counties make some use of gravel and shell roads, but most of them have learned the economy of macadam and telford construction. The Commissioner notes as an evidence of the growing interest in road improvement the increased demand from all parts of the country for the reports of his bureau. Aside from the record of the work in the State, the report shows what is being done in road building in other countries and States, and has a few papers on germane topics. There are many illustrations, showing the State roads before and after improvement, and giving notable examples of road building abroad.

FIFTH ANNUAL REPORT OF THE COMMISSIONERS OF FISHERIES, GAME AND FORESTS OF THE STATE OF NEW YORK. Albany: James B. Lyons, State Printer.

This is one of the most elaborate and attractive State publications that has been issued. It completes the work of the Commission under which it was prepared, the duties being transferred to another body. The delay in its appearance is due to the elaborate nature of the report, illustrated as it is with many beautiful full-page colored plates of the birds and fish of the State. It recounts the excellent work that has been done in New York State in the propagation and distribution of fish, the protection of game and the preservation of the vast forest area. In the latter branch of work the most important feature is the fighting of forest fires, and a large proportion of the report is taken up with the statement of what was accomplished in this line. New York State has made an excellent start in the establishment of the Adirondack Forest Reserve, but ceaseless vigilance is necessary to prevent danger from forest fires and the depredations of timber thieves. It is also necessary that some comprehensive scheme for reforestation shall be inaugurated. One of the most important things of all is that the public interest should be stimulated in our forests, and we believe this can best be done by the appearance of so thoroughly attractive a volume as this.

BULLETINS OF THE UNITED STATES GEOLOGICAL SURVEY. Charles D. Walcott, Director. Washington, D. C.: Government Printing Office.

We have received a number of recent bulletins of the United States Geological Survey. "The Geographical Dictionary of Alaska," by Marcus Baker, is a carefully compiled volume of nearly 500 pages of the utmost importance at this time, when the development of Alaska is proceeding so rapidly. The compilation represents a vast amount of work and the dictionary has already been approved by the United States Board on Geographical Names. "Oil and Gas Fields of the Western Interior and Northern Texas Coal Measures and of the Upper Cretaceous and Tertiary of the Western Gulf Coast," by George I. Adams, is a study of the geological conditions in a territory that is now attracting wide attention to its oil and gas resources. "On Pyrite and Marcasite," by H. N. Stokes, is an important contribution to the study of the secondary enrichment or ore bodies. It describes a method for the quantitative determination of these sulphides when in mixture and discusses some of their relations to copper. "The Occurrence and Distribution of Corundum in the United States," by Joseph Hyde Pratt, is a careful study of the various deposits of a mineral that is assuming greater importance as the uses to which it is put are constantly multiplying. "The El Paso Tin Deposits," by W. H. Weed, is a very brief account of a bed of ore discovered in 1899, and but slightly developed as yet. "Results of Spirit Leveling for the Fiscal Year 1900-1901," are presented by H. M. Wilson, J. H. Renshaw, E. M. Douglass and R. U. Goode, geographers in charge of the various sections of the Survey. The same gentlemen, in another bulletin give "The Results of Primary Triangulation and Primary Traverse, During the Fiscal Year 1900-1901." A volume of more than 800 pages

contains a catalogue and index of the publications of the United States Geological Survey from 1880 to 1901, prepared by Philip Creveling Warman. The publications of the Survey make up a fair-sized library by themselves. The value of this admirable index in making available the vast amount of useful information contained in hundreds of bulky volumes will be appreciated by all stone men.

SULPHUR, OIL AND QUICKSILVER IN TRANS-PECOS, TEXAS. Austin, Texas: Van Boechman, Schultze & Company, Printers.

This is Bulletin No. 11 of the University of Texas Mineral Survey, Prof. William B. Phillips, director. The first bulletin dealt with Texas petroleum and was issued about September 1. The present pamphlet contains two reports on the sulphur deposits of El Paso County, showing that they are well worth attention and could supply large quantities of sulphur to commerce. There is also a description of the quicksilver ores in Brewster County, showing the extent of the field, the value of the product and the possibilities of further development. The report of the operations of the survey from its organization in May, 1901, to the close of the year, show that more than 3,000,000 acres of public land in the Trans-Pecos region have been examined. The survey now has in hand the preparation of a bulletin on the fuels and asphalt rocks of Texas. We shall be glad when the Survey issues its promised bulletin on the building stones of the State, as we believe that this will do more than anything else for the development of the quarrying industry.

A Fireproofing Combination.

The stockholders of the National Fireproofing Company, of Pittsburg, unanimously voted to increase the capital stock from $5,000,000 to $12,500,000, to provide $1,000,000 working capital and to purchase eighteen plants now operated by fifteen different companies. The company controls the fireproofing, conduit and hollow tile building block business of the United States.

The new companies to be absorbed are: Pioneer Fireproofing Company, Illinois Terra Cotta Lumber Company, E. V. Johnson & Co. and the W. B. Owens Company, of Chicago; Standard Fireproofing Company, Woodbridge, N. J.; Henry Maurer, Maurer, N. J.; Lyth & Son, Buffalo; Federal Clay Manufacturing Company, operating five plants, Greentown, O.; Haydenville Mining & Manufacturing Company, Haydenville, O.; Lynch & Son, Washington, D. C.; Delaware Clay Manufacturing Company, Delaware, O.

Several of the conduit companies absorbed have large orders in London and Buenos Ayres. The company is now in a position to ship this from tidewater to tidewater very cheaply. The company now controls patents for building blocks in Pennsylvania and Ohio and will acquire those for the United States.

Organization of Italian Marble Exporters.

The leading exporters of Italian marble have formed an association in the Carrara district under the name of the "Unione fra gli Esportatori di Marmo." The object of this combination, as stated by a circular sent out by the president, is as follows. "First: To unite in one association the individual energies of the members for the purpose of regulating and developing the marble trade and for the protection of exporters and purchasers of marble. Second: To formulate and adopt from time to time a tariff fixing minimum prices under which no member of the association will be allowed to sell. Third: To fix rules and conditions of sale."

The officers are: President, Bernardo Fabbricotti; vice-presidents, Thomas Robson and Salvini Gino; secretary, Francesco Cucchiari; treasurer, Pollina Alfredo. Signor Fabbricotti in his circular, which is in English, German, Italian and French, says: "I trust that by the formation of this association the relations between producers and consumers will be improved and that a mutual advantage will be derived therefrom. I shall be pleased at your request to forward you a list of the names of members for which I hope you will reserve your esteemed orders."

The members of the association include Macfarland & Company, of this city, Pisani, Sons & Company, who are represented here by Pisani Bros., and H. T. Dempster, Charles Denham, Odling & Sons, and Walton Gooddy & Cripps, of London.

The condition of the marble trade in Italy has been far from satisfactory for a number of months past. The strikes, that were widespread throughout the district, curtailed production for some time, and caused a great scarcity of Italian marble in this market.

Queer Mines in Canada.

According to a report from Consul-General John L. Bittinger, from Montreal, a natural soap mine and a paint mine are two of the latest mineral discoveries in the northwest. Several soda lakes have been found in the foothills near Ashcroft, British Columbia. Their bottoms and shores are incrusted with a natural washing compound, containing borax and soda. No two analyses agree exactly as to the composition of the material; a New York analysis gives 26 per cent. borax, while a Montreal chemist, from the same sample, gives 16 per cent. borax. Tests prove the substance to be equal to the washing powders in common use. Trials by blacksmiths and farm workers show that it will remove grease and dirt quicker than soap. A syndicate of British Columbia men has been formed to put the product on the market. About 275 tons of the compound have been cut and taken out of the lake. It is handled precisely as ice is handled. The blocks are more than 9 inches in thickness, are sawn into pieces of 15 by 18 inches, and weigh 50 pounds each. It is estimated that this lake alone contains 20,000 tons, proving that the industry, if successful, will reach larger proportions.

The Longest Aerial Tramway in the World.

The contract for the machinery of an aerial wire rope tramway connecting the Ferris-Haggerty group of mines with the Boston-Wyoming Smelter at Grand Encampment, Wyo., has been let to the A. Leschen & Son Rope Co., of St. Louis, Mo. The tramway to be installed is the Leschen Co.'s patent, which operates automatically in receiving and discharging.

This will be the longest aerial tramway in the world, having a length of sixteen miles. There are numerous tramways of the Leschen Co.'s patent automatic type now in successful operation throughout the mining regions.

Great Stone Bridges.

A list of stone arches of more than 60 metres span is given by M. Dutreux in "Genie Civil" for January 18, 1902. The greatest span is the Trezzo bridge, built over the Adda by the Duke of Milan, Barnabo Visconti, in the years 1370-77. The span is 72¼ metres, and the bridge was destroyed by war in 1416. No other bridge exceeds 70 metres, except one just completed at Luxembourg. Cabin John Bridge, near Washington (1860) has a span of 67.1 metres. A few European bridges have spans of 60 metres. The bridge at Chester, England, is nearly 61 metres span. The new Luxembourg Bridge has a central arch with a span of 84.65 metres and two side arches of 21.60 metres. The bridge is 16 metres wide and presents several interesting features in its construction.

Moving a Church.

The site of the First Presbyterian Church on Wood street, Pittsburg, has been sold to Henry W. Oliver, who will erect an office building at this location. The church itself, which is a large and attractive structure, will be removed intact to a new site on Sixth avenue. The contract for the removal of the building has been awarded to the House Wrecking Company, of Chicago, which has had a great deal of experience in similar undertakings, for $19,500. The church will be placed on rollers to be moved.

A Stone for Polishing Metal.

Prof. J. P. Edmonds has discovered on his farm near Scottboro, Ala., a stone that has proven to be an extra quality of polish for metal, marble and glass. It is a natural product, a bisilicate of ammonia, and is found in large quantities on the mountain place of Prof. Edmonds. A movement is now on foot to organize a company for the purpose of manufacturing and placing the product on the market.

The quarries at Stonington near Mitchell, Ind., are yielding the finest kind of limestone. A new quarry has been opened on the Beaucox land and a switch has been built to it. The American Quarries Company have just received an immense new Baldwin switching engine.

The Boston Blanchard Slate Company has been organized at Bangor, Me., with a capital stock of $200,000. The president and treasurer is Charles Hamlin, of Bangor. The directors include John G. Wright, William V. Killen and Frank S. Sherburne, of Boston, and William M. Bullivant and John W. Wecks, of West Newton, Mass.

Another new company is to start up in the Arkansas slate fields at Mena. This is the Arkansas Slate Company, in which Texas capital is largely interested. The quarry to be developed is located between the Atlas and the Southwestern Slate companies' properties, east of Mena. The prospecting was done by William Wylie, of Babyruth City, and Rice Rutherford, of Paris, Texas, is to be manager.

BOOKS

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Advertisements inserted in this department for 15 cents a line each insertion.

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Experts report supply inexhaustible, best up-to-date building stone—uniform and warm color, will quarry any dimension, breaks across the grain, chips off good, holds a corner, cuts, letters, takes a good polish, and granite enough to more than supply New York State and cities. Communicate with owner.

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The property held under lease by the New York and Brewster Granite Company, situated on the Harlem Railroad, near Brewster, N. Y., known as the Hyatt property, recently operated by New York parties. The property contains a fine ledge of grey granite, also one of fine pink granite. The lease, which has 25 years to run, together with machinery, including boiler, engine, derrick, drill bars, blacksmith tools, etc., etc., will be sold outright or sub-leased to a reliable party on a royalty basis, such party to furnish satisfactory guarantee of his ability to handle such a property.

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VOLUME XXIV. **NUMBER 3.**

STONE.

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HARMANUS BLEECKER HALL, ALBANY, N. Y.

STONE

VOL. XXIV. NUMBER 3.

ARCHITECTURE AND STONE WORK IN ALBANY.

A CITY that celebrated the two hundredth anniversary of its incorporation so long ago that the memory of it is becoming faint with the present generation; a city that stood in the very midst of the "debatable ground" in a great war and yet never knew the tread of a hostile army; a city that is the capital of the greatest State of one of the greatest countries in the world; a city of wealth and culture whose sons have won distinction in every walk of life; surely these are claims which give a right to the titles "Ancient and Honorable" to an American municipality. These are the claims which may be put forward without fear of contradiction on behalf of the City of Albany, the Capital of the State of New York.

Although the history of Albany runs back to the beginning of the 17th century, tradition has to do with even an earlier period. On the map of Gerard Mercator, made in 1569, a fort is represented on the east side of the Hudson River. The ruins that the Dutch settlers found on "Castle Island" below Albany are supposed to be those of the fort marked on Mercator's map, built by the French navigators. Tradition claims even an earlier date for a part of these ruins and attribute them to Spanish adventurers. History takes up the thread of the story when Hendrik Hudson sailed up the river which bears his name, in 1609. On September 18 of that year the Half Moon cast anchor where Albany now is. Indians in great numbers came aboard the little vessel with grapes and pumpkins and beaver and otter skins and traded them for beads, knives and hatchets. According to the records that have survived, Hudson and his mate were suspicious of the purpose of the Indians and "determined to try some of the chief men of the country whether they had any treachery in them." He invited the chiefs and head men into his cabin of the Half Moon and "gave them so much wine and *aqua vitae* that they were all merry." The memory of this famous carouse passed into the tradition of the tribe. A boat's crew was sent north, but they found no chance for further passage, so the Half Moon was put about and sailed down the river.

The fertile lands about Albany, well wooded and watered, were left to the savages until 1614, when settlers were sent out by the Dutch West India

Company and located below the present site of the city. In 1623 a party under Adrien Joris, consisting of eighteen families, erected Fort Orange, by which name Albany was known for a number of years. In 1626, in consequence of an attack by Indians, during which one of the sturdy Dutchmen was killed and eaten by the Mohawks, the families moved to Manhattan, and

THE STATE CAPITOL.

a garrison of sixteen men without any women were left at Fort Orange. In 1630 Kiliaen van Rensselaer, a director of the West India Company, who had grown rich in Amsterdam by dealing in pearls and diamonds, purchased from the Indians a vast tract of land surrounding Albany, and was given the privileges and exemptions of a "patroon." Afterwards this territory, which included nearly all of what is now Albany, Rensselaer, and Columbia counties, was called Rensselaerwyck. Colonists were sent out in number, and thereafter the city grew rapidly in size and prosperity. It was known subsequently as Beaverwyck and Willemstadt. The city received the name of Albany in honor of the Duke of York and Albany, afterwards James II., at the time when it came into the possession of the English in 1664. It was chartered as a city in 1686 by Governor Dongan.

The situation of Albany was favorable for its commercial development. It was at the head of tide water on the Hudson River, and during the days of small sailing vessels its traders sent their products directly from their wharves to the marts of the old world. It was the outpost for trade with the Indians, and through its markets passed the furs of the north. Its population was largely made up of shrewd Dutch merchants whose wealth was proverbial even in the days of the infant colony. It was the seat of an almost feudal principality, under the wise direction of successive generations of the Patroons Van Rensselaer. It was but natural that evidence of the wealth and culture of its inhabitants should be found in the architecture of the city. In addition to the forts (necessary to guard against the raids

of the red men), the churches, and the warehouses, there were stately manor houses, attractive mansions and the solid, substantial homes of the burgesses. Many of these buildings were of stone and brick. Strangely enough the bricks were brought over from Holland, although in the immediate vicinity of the city were enormous deposits of clay suitable for brick burning.

In the quaint colonial records and in the family letters and diaries that have survived are accounts of some of the more striking buildings and of the ceremonies that attended their erection. The Dutch craftsmen were proverbial for their thirsty throats, and work never progressed rapidly unless liquor was freely dispensed at every stage of building construction. In this magazine a few months ago was given an account of the erection of the first stone house in Albany in 1656. This was the Government House, or fort, constructed under the direction of Jan de la Montague. It cost 12,213 guilders in wampum, or about $3,500. A bill for the brandy, rum and beer furnished the workmen amounted to no less than 716 guilders. Liquid refreshments were demanded and received by the workmen when the old

High School. State House. City Hall.

A GROUP OF PUBLIC BUILDINGS.

wooden structure occupying the site was demolished, when the corner stone of the new building was laid, when every course of beams was set, when the roof tree was put in place, when the tiles were laid, and when a curious winding stairway was completed. In addition to this, the teamsters, the laborers, the stonecutters and the masons were given a daily allowance of a gill of brandy and three pints of beer apiece. The entire record is one of the most curious accounts that has come down to us of the building practices of the early days. It illustrates most forcibly the objections that were urged

to the cost of building in the colony because of the enormous liquor bills. Even the churches were not exempt from this kind of tribute.

The early houses in Albany followed closely the Dutch style of architecture, with narrow windows, steep roofs and towering gables. This characteristic led to the mistake of the early geographer, who gave the impression that the inhabitants had their "gable ends to the street." The appearance of these old Dutch houses is perfectly familiar to the present generation, not only from numerous pictures, but from several buildings themselves which stood unaltered until a few years ago. One of these buildings, notable because Alexander Hamilton once lived in it, remained standing in the most prominent position in the city, the corner of State and Pearl streets, until a few years ago, when it was demolished to make room for

THE COUNTY BUILDING.

modern improvements. These buildings had very little that was characteristically American about them. The section of the city that contained them was merely like a bit of old Holland transferred to the new world. But, with the manor houses and the suburban mansions, new problems in house construction were to be met with, and here began the development of that beautiful style we call colonial architecture. The famous Van Rensselaer

manor house was built in 1765 on the northern outskirts of the city near the river, and was torn down several years ago to make room for warehouses. This was a striking and beautiful example of colonial architecture, built of brownstone, with a porch front and rear opening into a wide salon, running through the house. At either side were wings of one story, added as the

STATE STREET AND BROADWAY, SHOWING OLD MARBLE BUILDING

family grew. Not only was this a splendid example of early American stone work, but its interior fittings were a tribute to the taste and skill of our cabinet-makers and carpenters. The Patroons Van Rensselaer dispensed a generous hospitality, and the walls of the manor house sheltered many of the most distinguished Americans. As one of the most famous of American houses it should have been preserved with religious care.

Fortunately two of these beautiful colonial houses are still preserved. One of these is the old Schuyler mansion in the southern part of the city. This is on a commanding knoll overlooking the river. When it was built it stood alone and a considerable distance from the settlement, but now the city has grown up all around it. Architecturally it is not as striking as the manor house, but it is an example of the solid, dignified and comfortable homes our forefathers made for themselves. The building is known to school children all over the country because of a dramatic incident which took place within its walls. During a raid by the Indians in the absence of the head of the household, the family barricaded themselves in the upper story. It was then found that a baby had been left asleep in its crib on the ground floor. A little daughter of the house ran down the stairs, snatched up the child and made her way safely back again. While she was going up the stairs the Indians entered, and one of the warriors threw a tomahawk

at her. It missed its mark, but struck the rail of the stairs. The gash it cut is to be seen to this day. It would require an entire article to recount the part that this building has played in the early history of the State. The property is now in the hands of the Catholics and is carefully preserved.

THE ALBANY HOSPITAL.

On the flats a few miles north of the city is an older Schuyler house still standing and owned by the descendants of the original builder. It is not as pretentious as the later structure, but is a treasury of historical memories.

OLD DUTCH CHURCH, TORN DOWN IN 1806.

A mansion built by one of the younger generations of the Van Rensselaer family is falling to ruins on a bluff across the river from Albany. This closely follows the style of the original Van Rensselaer manor house, but

ST. PETER'S EPISCOPAL CHURCH.

was more elaborately decorated. There were marble stairs, floors and wainscoting. Not only was the marble itself the choicest product of the Italian quarries, but the workmen who carved and set it were brought over from Italy and given employment for many months. The building passed out of the hands of the original owner, and owing to various complications was allowed to fall to ruin, although it is one of the richest and most expensive buildings erected in the early days of the State.

Another Van Rensselaer house is still standing across the river from Albany. This is a severely plain brick building with stone trimmings, the latter containing one feature almost unique in American houses. Square

HOTEL TEN EYCK.

blocks of stone set in the walls between the windows are cut with loop-holes so that the dwellers might protect themselves from predatory Indians. The loop-holes resemble huge inverted key-holes. This building is known as

ALBANY SAVINGS BANK.

Fort Cralo, and it is claimed that within its walls was written the famous song, "Yankee Doodle."

Aside from these historic buildings the city contains hundreds of build-

THE EXECUTIVE MANSION, OF BRICK AND SANDSTONE.

ings that are of interest to the architect and the stone cutter. There are rows of houses in the older part of the city now given over to use as tenements or boarding houses that were once the homes of the rich and cultured. These are beautiful examples of the best style of street architecture of the early part of the nineteenth century. They are mostly of brick and frequently make use of white marble for foundations, stoops, porches and trimmings. They have beautiful recessed entrances, with elaborate fanlights over the doors and richly carved wooden columns. Fine examples of simple but artistic wrought iron work still survive in these houses. Considerable use was made of white marble in the public buildings of the city in the middle of the last century. Two of the most important structures, the State House and the City Hall, were built of this material. At the corner of State street and Broadway is an old building of white marble known as the Museum, and now used by the Western Union Telegraph Company. For many years it has been a landmark, but is soon to be torn down to give place to a sky-scraper.

Albany's principal fame for stone work comes from the State Capitol, which, set high on a hill, dominates the entire city and can be seen for many miles in every direction. That it cost $25,000,000 and was nearly a generation in building are known to all Americans. The changing of the style of architecture after the completion of the basement story has called for a

ALBANY TRACTION COMPANY'S BUILDING.

great deal of criticism from captious architectural writers, but the change does not destroy the splendor of the building, so effective from its enormous mass, so perfect in its proportions, and so beautiful in its ornamentation. The exterior is of Hallowell granite, but to name all of the stones that have been used in the building would be almost to give a catalogue of the struc-

A TYPICAL ALBANY RESIDENCE, TORN DOWN TO MAKE ROOM FOR THE EXECUTIVE MANSION.

tural and ornamental stone of the world. There are limestones and sandstones, among the latter being the product not only of American quarries, but use having been made as well of the British and Nova Scotia sandstones. There are also marbles of various kinds, and the great wainscoting of Mexican onyx in the Senate Chamber is familiar to all stone men. The grand western staircase, built of red sandstone, cost about a million dollars and is one of the most elaborate and beautiful examples of stone carving in America. The capitals of the columns are adorned with heads of distinguished citizens of the State carved in relief. It is doubtful whether a staircase as imposing as this is to be found in the world. The old Capitol was a famous building in its day. It was built of brown freestone quarried along the Hudson below the Highlands. The marble used in the interior came from the Berkshires in Massachusetts.

The city is particularly fortunate in its public buildings aside from the Capitol. This last building is at the head of State street, one of the broadest thoroughfares in the country. In front of the building is a park with magnificent trees, and at one side, across a wide plaza, is another park of equal

ALBANY SAVINGS INSTITUTION.

size. Fronting this open space are a number of fine buildings in widely different styles of architecture. Besides the Capitol, to the north there is the Albany Academy, a beautiful building in modified Renaissance style, built of brownstone in the early half of the nineteenth century. On the south and farthest from the Capitol is the high school, of brick and bluestone. Next is the State Hall, of classical design, built many years ago of white

THE UNION DEPOT.

marble. Next, and almost opposite the Capitol, is the City Hall, one of the most striking creations of the late H. H. Richardson. This is built of Milford pink granite, with Longmeadow trimmings, and a peculiar feature often commented upon is that the darker stone is used above and the lighter stone beneath. From the illustration it will be seen that the top of the campanile tower is of the dark stone. This is a very daring innovation, but that it is beautiful and effective few would deny. The former City Hall, which occupied the same site, was a domed building of white marble, the stone having been quarried at Sing Sing. The dome, which was heavily gilded, was a striking feature of the landscape. Few cities can show such a group of buildings in so beautiful a location.

The County building is another striking stone public building, occupying an important corner on State street below the capitol. This was originally built in 1874 for the Albany Savings Bank. It is of granite and was erected after plans by Messrs. Fuller & Woolett. It was sold to the county in 1896, although the bank continued to occupy it until their magnificent new structure, to be described later, was completed.

The Government has taken its part in the enrichment of the city by the erection of the massive and dignified post office and federal building, of granite, on Broadway at the foot of State street.

Dudley Observatory was founded in the middle of the last century through the generosity of a public-spirited woman. A group of buildings was erected on a hill to the north of the city, but the constantly increasing traffic on the railroad just at the foot of the hill disturbed the delicate instruments, and some years ago the observatory was removed to the western part of the city, where a group of modern and attractive stone and brick buildings was erected. The observatory forms a portion of the extensive educational system of the city, which includes the famous Law School, numbering the late

President McKinley among its graduates, a Medical College, a College of Pharmacy, a State Normal School (a fine modern building of brick and sandstone), a high school, and many modern and well built grammar and primary schools.

Many years ago a wealthy Hollander named Harmanus Bleecker made his home in Albany. At his death he left a large benefaction to the city to be used for public purposes. The fund was carefully managed, and some

PUBLIC BATH.

years ago it was determined to use it for the erection of a public hall containing an auditorium of sufficient size for conventions and other meetings likely to be held in a capital city. The plans for the structure were drawn by Messrs. Fuller & Wheeler, architects, and the hall, which is of very large size, was provided with a stage suitable for great operatic and theatrical performances. This building is of brick with Longmeadow sandstone trimmings. It is effective architecturally, although it is not ornate.

For some years Albany lacked suitable hospital accommodation. This want has been fully supplied, however, by the completion, one or two years ago, of the Albany Hospital, a group of modern buildings finely built and magnificently equipped, in the western portion of the city, near Dudley Observatory. These buildings were designed by Mr. A. W. Fuller, of Albany, and were built of brick with Longmeadow sandstone trimmings. Fortunately plenty of ground was available, and the arrangement of the various wings permits adequate lighting and ventilation for every ward and room.

Another crying need that has just been supplied was for a union depot. The old station, used by the New York Central and Boston & Albany railroads, was entirely unsuited for the amount of traffic that centered in Albany. When the old Delavan house, a famous hostelry in the middle

of the last century, was burned with appalling loss of life, it was felt that this would make a most suitable location for a depot, and the site was secured. Upon this property has just been completed one of the most beautiful and convenient passenger stations in the country. It was designed by Messrs. Shepley, Rutan & Coolidge of Boston. The exterior is of pink Milford granite. Free use has been made of marble in the interior decoration. The fireplaces are of Verd Antique, the base of black marble and the staircase and lavatory work of white Italian.

A magnificent modern hotel, but recently completed, is the Hotel Ten Eyck on State street, half way between the post office and the Capitol. This was designed by H. Neill Wilson, of Pittsburg, Mass. Indiana limestone was used for the exterior, while for the interior decoration Scaggliola was employed.

The Albany Savings Bank has erected for itself one of the finest banking buildings in the country. The design chosen after wide competition was by Henry Ives Cobb of Chicago. The building is one story in height and is surmounted by a dome, giving a height from the floor of the banking room to the apex of the dome of 94 feet. It is built on a corner, and the front and side facing on the streets are of dressed light Hallowell granite. The main entrance leads to a loggia, the pediment of which is supported by six immense granite monoliths, thirty feet long and weighing about twenty tons apiece. The main banking room is lighted by the dome. The floors of this room are of Tennessee marble of a uniform selected color, and the entire banking room is wainscoted with pure white statuary marble, sixteen feet high, topped with a handsomely carved moulding. The plain effect of the marble is relieved by beautifully carved marble pilasters placed at intervals. At the south end of the room is a magnificent fireplace constructed of marble of antique design. Over the mantel is a huge allegorical picture in mosaic representing "Thrift and Frugality." The figures are somewhat larger than life size, and the entire mosaic occupies a space 14x17½ feet. It was designed by Frederick Dielman, President of the National Academy of Design, and was executed under his direction by the Societa Venezia-Murano, in Venice.

Two of the most recent buildings are the Public Bath and the Albany City Savings Institution. The formed was designed by Mr. A. W. Wheeler and makes use of Vermont marble.

The Albany Savings Institution is the nearest approach the city has to a skyscraper. It will be seen that the architectural treatment is very effective. It was designed by Marcus T. Reynolds of Albany. The exterior is of pink granite from the Bay State Granite Company of Worcester. The interior is a fine example of marble work, use having been made of the imported Irish marble from Connemara and various Vermont marbles. Mr. Reynolds was also the architect of the very artistic new building for the Traction Company, the exterior of which is of Indiana limestone and the interior freely decorated with Vermont and Tennessee marble.

Although another city has been given the title of the "City of Churches," Albany has always been noted for its many beautiful houses of worship. The

first church in the city was built in 1645, and in size it measured 19 x 34 feet. It contained a pulpit with a canopy, seats for the deacons and magistrates and nine benches for the congregation. In 1656 a larger church was built at the junction of State street and Broadway, now the two principal thoroughfares. This stood until 1715, when the growth of the city necessitated a more commodious structure. The erection of this building was marked by one peculiarity that can scarcely be matched in the entire history of church architecture. It was built around the old church, in which the congregation continued their services on Sundays. When the new building was completed the old one was dismantled and removed piecemeal through the doors. This church served its purpose for nearly one hundred years, being finally demolished in 1806. A picture of it is shown herewith. When the church of 1656 was built, the congregation subscribed "twenty-five beavers" for the purchase of a pulpit, which is still preserved in Albany. In order to add to the church adornments the richer members were allowed to have their armorial bearings painted on the windows.

It is doubtful if any American city of equal size can show as many striking churches at this time as Albany, the total number of such edifices being no less than seventy-two. As it is both a Catholic and an Episcopal see, there are two cathedrals, that of the latter denomination being unfinished as yet. The Roman Catholic Cathedral of the Immaculate Conception crowns a hill as commanding as that which bears the Capitol. It is a Gothic structure of large size designed by Patrick C. Keeley of New York. It has two beautiful spires and is built of brownstone. It is not elaborately ornamented, but is finely proportioned and is remarkable for its dignity. The interior is of light sandstone, and it has a magnificent altar and a great triple organ. The Episcopal Cathedral of All Saints is of red sandstone, and when it is completed it will be a striking structure. It is being erected after plans by R. W. Gibson of New York. Unfortunately it has not a commanding site. It is shut in by narrow streets and is somewhat dwarfed by the Capitol, only a block or two away. The Cathedral contains some magnificent mosaic work and has richly carved stalls bearing the date of 1623 taken from an old church in Bruges and the work of monks. The Bishop's staff is made from wood which once formed a part of the refectory of a monastery founded by St. Augustine in Canterbury during the seventh century.

One of the most beautiful of all of the Albany churches is St. Peter's Episcopal church. This is one of the oldest congregations in the city, and the present structure, built many years ago, but with the tower and spire added comparatively recently, replaces several older churches that were occupied successively. It is of Schenectady bluestone with New Jersey brownstone trimmings. From the illustration it will be seen that it is after the Gothic style and that there is considerable ornamental stone work. It has some exceptionally fine stained glass windows and also fine mosaic work. There is also a silver communion service of six massive pieces, dated 1712, and bearing the inscription, "The gift of Her Majesty Ann by the Grace of God, of Great Britain, France and Ireland, and of the plantations, in North America, Queen, to her Indian Chappel of the Onondawgus."

Albany might almost be described, like Rome, as sitting upon seven hills. The central one, as has been shown, bears the Capitol, and the one to the south the Cathedral. The hill to the north also bears a fitting architectural crown. This is St. Joseph's church, a Roman Catholic edifice. Many critics have held that it is one of the most beautiful of American Catholic churches. It was designed by Mr. Keeley, of New York, in the Gothic style. The body of the church is of blue limestone, and very free use has been made of Caen stone for trimming and ornamentation. This affords a decided contrast and gives an effect of lightness and delicacy that is most pleasing.

The Second Presbyterian church, erected in the early part of the nineteenth century, is an example of the severely plain block-like structure so characteristic of American churches. It is built of bluestone laid in random courses. The weather-vane that surmounts this church has called forth much comment. There is a gilded ball like a mammoth pumpkin, surmounted by a huge gilded fish. Another striking church weather-vane is in the form of a crowing cock. It was formerly on the old Dutch church at the foot of State street and came from Holland in 1656. It is made from beaten brass and bears the mark of three bullets. This is now in place on the Madison Avenue Reformed church, which is built wholly of stone. Incorporated in this structure are foundation stones from the old Dutch church described above, and bearing the date 1715.

As in most old cities, the dead in Albany were formerly buried in the church yards. As the city grew in population it was found necessary to establish a large cemetery where the dead might rest secure from the danger of removal. In 1844 a large tract of land was secured midway between Albany and Troy, and the Albany Rural Cemetery was dedicated. It is one of the most beautiful cities of the dead in the country. It has every advantage of location and natural beauty. There are many small lakes and ravines with waterfalls and countless old trees of every variety. This has been skilfully laid out by landscape gardeners and is adorned with thousands of beautiful monuments. Adjoining it is St. Agnes' Cemetery, the Catholic burial place, not so old as the former, but also marked by artistic mortuary sculpture. It is impossible within the limits of a single article to give even a mere catalogue of the striking examples of stone work to be found in these cemeteries. It is necessary, however, to speak of one memorial that has given the Albany Rural Cemetery distinction throughout the country. This is "The Angel at the Sepulchre," the work of Erastus Dow Palmer, a distinguished American sculptor and a life-long resident of Albany. This has been declared by many competent critics to be one of the most striking examples of mortuary sculpture in the world and the finest bit of outdoor statuary in America. Mr. Palmer took as his inspiration the text, "Why seek ye the living among the dead? He is not here, but is risen." Sculptors have generally chosen to represent angels as female figures, spiritualized, of course, but with more or less of weakness in the features and pose. Mr. Palmer's angel is a celestial man of heroic height—seven feet. The face is of wondrous beauty, with the strength and intellectual force that the old Grecian sculptors loved to give to their young gods. The figure is seated in an attentive

attitude, and the hands are naturally placed, one on the knee and the other on the leg. The single seamless garment falls in graceful folds. The statue is given a commanding situation on the crest of a hill, the figure looking off over a wide range of beautiful landscape. The "London Art Journal" published a steel engraving of the statue, and said in connection with it: "The figure is of heroic size, and is a production of great artistic power. Exception may, perhaps, be taken to the face as too stern, and not angelic, and yet it is grand in expression and very beautiful. He is seated on the stone in an attitude of dignified repose, his flowing locks reaching down over the upper portion of the wings, and his entire form covered by a garment disposed in its folds and setting with remarkable grace. There is no conventional treatment here; it is the outcome of an original and earnest mind, a statue which the greatest living sculptor might acknowledge with pride as his own."

But one other of the many beautiful monuments can be mentioned. This is erected over the grave of Chester Alan Arthur, twenty-first President of the United States. It is designed by E. Keyser of New York City. A dark granite sarcophagus, perfectly plain and highly polished, rests upon two pieces of lighter colored granite, also polished. At one corner, in heroic size, stands a bronze Angel of Sorrow placing upon the sarcophagus a palm leaf. The design is original and extremely effective.

A MAGNIFICENT MARBLE STATION FOR WASHINGTON.

THE plans that have been prepared for the improvement and beautifying of Washington are among the most elaborate and comprehensive that have ever been considered by any municipality. If they are carried out, and the indications seem to be that Congress will treat the matter in a liberal spirit, the result will be that we shall have in our National Capital what will probably be the most magnificent city that the world has ever known. Even in its present condition Washington has called out unstinted praise from the most critical visitors beyond the sea. It will be remembered that Mr. Silvanus Trevail, the new President of the British Society of Architects, lamented the fact that London could show nothing approaching the great avenues of Washington in their architectural effect. Mr. Frederick Harrison declared that the Capitol with its magnificent surroundings surpassed any public building now in existence and could probably be approached only by the Parthenon at Athens in the height of its glory. The publication of the report of the Committee having the matter of the proposed improvements in charge has stirred the architectural authorities of the old world. The following from the Builders' Journal and Architectural Record, shows the appreciative spirit in which the English experts treat the matter:

"Whilst we have been busy with a national scheme to commemorate Queen Victoria the Americans have been formulating a much greater scheme for the development of Washington, a scheme which, so far as landscape architecture is concerned, is more magnificent than any carried

out in recent times. Washington has very deservedly been called the City of Magnificent Distances. Its plan is undoubtedly the finest which the United States possesses, thanks to the genius of that young French officer, L'Enfant, who was so admirably suited for collaboration in the great projects of Washington and Jefferson. Some time ago a committee composed of the two foremost of American architects, a noted landscape architect and an eminent sculptor, was selected to evolve a scheme for the development of Washington on a scale compatible with the glory of the nation; and after most thoroughly investigating the matter and spending a summer tour in Rome, Venice, Vienna, Buda-Pesth, Frankfort, Berlin, Paris and London—thus embracing the whole of European effort—they have produced a remarkably fine plan, both as regards practical workability and artistic merit; and though it is impossible to describe in words the effect of their scheme, some particulars may be given from which at least some idea of its grandeur can be gained. It is proposed, then, to make the Mall of a uniform width of 1,600 feet throughout its entire length, and the axis of the Capitol and the Washington Monument is to be defined by an avenue a mile and a half long and 300 feet wide, with elms planted on either side, four abreast. The cross axis of the Mall, forming a thoroughfare between the body of the city and river-front, will be laid out as a garden, and areas adjacent to the Mall and averaging more than 400 feet in width from the Capitol to the Washington Monument are set aside as sites for the museums and buildings devoted to scientific purposes; while the unsightly railway terminus which is now in the Mall, will be removed to another portion of the city. Not only will the Monument thus be brought into the Capitol vista, but the Mall will be resorted to its original use as a grand setting for the two great buildings of the nation, the Capitol and White House. To the distance of a mile and a half from the Capitol to the Monument the reclamation of the Potomac flats adds another mile, giving opportunity for an extension of the treatment accorded the Mall and also of a new and great memorial to Abraham Lincoln, to stand on the axis of the Capitol and Monument, near the bank of the Potomac; the proposed memorial consisting of a portico of Doric columns 250 feet long by 220 feet in width. In addition, a broad paved quay or landing space will skirt the Potomac, and thence a memorial bridge is proposed to be erected at a cost of £3,000,000. Connecting the Washington Monument and the Lincoln Memorial will be a canal 200 feet wide and 2,300 feet long similar to those at Versailles and Fontainebleau. West of the Monument it is planned to place a garden, which will create an axial relation with the White House, this being accomplished by a sunken garden framed in by tree-bearing terraces in the shape of a Greek cross; the center being marked by a great pool, with rectangular basins and a flight of steps 300 feet wide leading from the garden to the base of the Monument; and the whole scheme embodying a wonderful array of fountains. It is evident from these particulars how splendid the conception is. The cost will be enormous, but this will be no stumbling-block to our wealthy

cousins; and as there seems every probability of the scheme passing Congress, we may hope to have in Washington one of the most beautiful and complete of the cities of the world."

One of the first steps in the improvement of the city will be the erection of a new Union Railroad Station. For many years the stations have been the most prominent blot on the architecture of the city, and by their removal and the substitution of a station suitable for a city of the importance of the National Capital, there will be a decided step in advance. The removal of the old station will open a beautiful vista between the Capitol and the Monument. The grandeur of the new station can scarcely be appreciated from any description. The building will be on Massachusetts Avenue, with a frontage of 260 feet between North Capitol and Second streets, east. The station and the train shed in the rear will extend along Delaware Avenue a distance of more than 750 feet. The station proper will be about 90 feet in height, while the train sheds will reach a height of 125 feet. Three main doorways will be 60 feet high and 44 feet wide. The waiting room is 245 feet long and 135 feet in width. In the rear is the ladies' waiting room and the lunch room, the latter being 45 by 160 feet in size. Beyond the waiting room is the lobby, 80 feet wide and 550 feet long, giving entrance to the trains. The train shed will have room for thirty-six tracks and will be roofed with three arches, the central one 289 feet in width and those on the sides 167 feet wide each. At the western end of the building there will be an entrance for cabs, which will have their stand inside the inclosure. The entire structure will be in the Roman style of architecture. It will be built of white marble in accordance with the general plan of the Commission to use this material for all public buildings in Washington. The interior will be striking not only because of the immense size but also from the magnificence of the finish, which will, nevertheless, be dignified and simple. The cost of the structure is expected to reach $5,000,000, and this will be borne wholly by the railroad companies.

STONE AND CLAY FOR BUILDING IN GREECE.

ROOFING tiles are manufactured in immense numbers in Greece. In and near the cities and large villages, there is scarcely any other kind of a roof in existence; but in the mountain villages, some of the roofs are covered with flat stones, or slabs of stone.

Tiles are manufactured in or near every city or town of any size in the Kingdom, suitable clay for the purpose being plentiful and widely distributed. The tiles are made by hand, the only machinery used being a simple and primitive "mixer," turned by a horse or mule, which mixes the clay in a pit in the ground.

Nineteen-twentieths of the tiles used are of the old shape, and there are two sizes. Each tile is four centimeters (1.5 inches) wider at one end than at the other. The two sizes are of the same length—45

centimeters (17.7 inches). The small size is eight centimeters (3.1 inches) wide at one end and 12 centimeters (4.7 inches) at the other. The large size is 12 centimeters (4.7 inches) wide at one end and 18 centimeters (4.06 inches) at the other. Sometimes, the tiles are laid in mortar, but usually they are kept in place merely by their own weight.

Of late years, a new tile, known as the "Belgian tile," is coming into limited use. It is flat and of a rectangular form, with hollows on the upper side to carry off the water, and with hollows and projections so arranged as to fit into the projections and hollows of the overlapping tile, thus binding each to the other and keeping them in place. The Belgian tile is the best tile for a steep roof.

With the exception of those located in and near Athens, the outfit of the Grecian tile manufactories is neither elaborate nor costly. A tile manufacturer of the smaller towns can often carry his entire outfit on the backs of two or three donkeys, and thus move his plant from village to village where there is a demand for tiles. Drain tiles and chimney tiles are made in considerable quantities. Nearly all the chimneys on dwellings in Greece are simply tiles built into the walls of the building and extending to three feet above the roof. Ventilators are made in the same way.

With the exception of those producing marble—of which there are many good varieties—magnesite, or other minerals, the mountains of Greece are principally limestone. Very few cities or villages of the Kingdom are far from a limestone quarry, and the houses are frequently built of this material, many of the best buildings being faced or ornamented with marble. But most of the houses even here in Athens are built of stone and stuccoed on the outside—and often on the inside—and painted in good imitation of marble. This stucco lasts many years on the exterior of buildings in this climate, where frost is seldom seen, and is cheaper than marble.

In some country villages, where the quarries are very far away or the roads are bad, houses are often built of sun-dried brick; but in portions of northern Greece, especially in the small villages of Thessaly, houses are built by first erecting a frame of willow poles and rods and then covering this wickerwork with a coating of mud or clay mortar.

Sun-dried brick are used in considerable quantities. The humbler houses in the suburbs of the cities of Athens, Piræus, and Patras, and in many villages where stone is not plentiful or easy of access, are built of sun-dried brick. In fact, in some villages the houses are nearly all built of this material. Many fences or walls throughout the country are composed of blocks of clay one yard square and half a yard thick, made in a manner somewhat similar to the manufacture of sun-dried brick. The brick, as the name implies, are dried by the heat of the sun only. They vary in color, according to the color of the clay used, and measure about 12 by 6 by 2½ inches. These brick are made in every village, town, and farm in Greece that has clay, and there are few places in the Kingdom that have no clay deposits. The annual quantity manufactured is not

known. They are sold by the number, at from $1.75 to $2 per thousand. They are sometimes laid in lime and sand mortar, but more often in mud or clay mortar.

Kiln dried or burned brick are manufactured in or near Athens, Volo, Chalkis, Pyrgos, and elsewhere in Greece; they are of a hard quality, and usually of a very light cream color. It is said that no soft kiln-burned brick are made. Kiln-burned brick are used for the erection of chimneys in factories, foundries, etc., partitions in buildings, bakers' ovens, and furnaces, and sometimes for building drains and sewers. Iron chimneys or "smoke stacks" are seldom erected.

On account of the limited use of kiln-burned brick in the Kingdom the manufactories of this material are few. There are but four or five of importance, and even those do not make brick exclusively—they also manufacture tile.

Like the sun-dried, the kiln-burned brick are made by hand, the only machinery used being the simple "mixer" propelled by horse-power.

The kiln-burned brick measure about 11 by 4⅝ by 1¾ inches. One man can mold 3,000 each day. The annual product of the manufactories of the Kingdom can not be learned.

After the bricks are molded, they are allowed to lie in the sun until partially dried and stiff enough to handle easily. They are then built up in an "open-work" manner similar to the method used in the United States, so that the heat from the fire can reach each brick. The fuel used is nearly always wood; and the fire, never very hot, is kept up about fifteen days.

Kiln-burned brick are sold by the hundred or thousand directly to the consumer at from $3.50 to $5 per thousand. They are very seldom shipped by rail or water, as such transportation is too costly.

In building, the kiln-dried bricks are laid in lime and sand mortar flat side down (never on the edge); but as the mortar is very often bad and gets soft in damp weather, cement is used in laying the brick in a construction which it is desired to make permanent.

Athens, Greece. DANIEL E. MCGINLEY.

THE MINERAL RESOURCES OF GEORGIA.

THE Geological Survey of Georgia, of which Prof. W. S. Yeates is director, is doing an excellent service in making known the mineral resources of the State. Few of the States are blessed with richer resources, or are showing a more steady and satisfactory advance in the development of the quarrying industry. Prof. S. W. McCallie, Assistant State Geologist, some time ago read a paper before the International Mining Congress on the Mineral Resources of Georgia, in the course of which he said:

"Previous to 1884 the marbles of Georgia were practically unknown as building and ornamental stones, but at present the output of the quarries exceeds that of any State in the Union, with the exception of Vermont.

The most valuable marbles of Georgia are those of the Crystalline area confined to Pickens, Cherokee, Gilmer and Fannin counties. These marbles occur in a narrow belt which runs parallel to the Atlanta, Knoxville & Northern Railroad, from near Canton, Cherokee county, to the Georgia-North Carolina State line, a distance of more than 60 miles. The main marble industry of the State is located in the vicinity of Tate, Pickens county, just north of the southern terminus of the belt where the deposit attains a thickness of nearly 200 feet.

"The Pickens county marble has a coarse texture, but admits of a very fine polish and is admirably suited both for building and ornamental purposes. In color the stone varies from white to almost black. A flesh-colored variety is also found in considerable abundance. The physical and chemical properties as shown by the numerous tests made by the State Geological Survey demonstrates that its durability equals or exceeds that of any other marble now being put upon the market. The stone is remarkably free from fissures and seams, so that monoliths suitable for huge columns can be quarried with ease.

"At present seven different marble quarries, having an aggregate annual output of several hundred thousand cubic feet of stone, are being operated in Pickens county. The product of these quarries is shipped to nearly every State in the Union, where it is used in the construction and decoration of some of the most costly buildings. The State capitols of Minnesota and Rhode Island; the United States Government building, Boston; St. Luke's Hospital, New York, and the Corcoran Art Gallery, Washington, with numerous other handsome buildings throughout the United States, are constructed wholly or in part of the Georgia marble.

"The granites of Georgia, together with the gneisses, constitute the most extensive and important building and ornamental stones in the State. They occur in inexhaustible quantities and are profusely distributed throughout the Crystalline area. One of the most interesting and probably the largest granite mass in the world is that of Stone mountain, located only a few miles northeast of Atlanta. This mountain, whose barren summit attains an altitude of several hundred feet above the surrounding country, has long been the seat of a very important granite industry. The stone obtained from these quarries is a light-colored muscovite granite possessing remarkable strength and is quite free from all chemical and physical defects. The stone has extensive use as a building material and is also largely employed in street improvement. There is likely no granite in the South more widely known and more generally used than that furnished by the Stone mountain quarries. It not only has an extensive local use, but much of it is shipped beyond the borders of the State.

"Another granite, or rather a granitoid gneiss, of almost as much economic importance as the Stone mountain granite itself, is the Lithonia gneiss. This stone, which differs chiefly from the Stone mountain granite in being laminated, covers a considerable area in the eastern part of DeKalb and the contiguous parts of Rockdale and Gwinnett counties. The Lithonia quarries are very extensive and furnish large quantities of stone for street

improvement as well as for general building purposes. Granites and granitoid gneisses similar to the above are found in many localities in North Georgia, but only at a few points have they been quarried to any extent.

"In addition to the granites and granitoid gneisses here named there are other granites of superior quality used for monumental stone. Some of the granites of this character which in the last few years have become quite popular as decorative stone are those obtained from the Elberton, the Oglesby, the Lexington and the Meriwether quarries. These monumental granites are fine-grained biotite granites unusually free from injurious minerals and admitting of a very brilliant polish. They have but few equals, if any superiors, in the United States as a decorative stone, and it is only a question of time when the Georgia monumental granite industry will be of very great commercial value to the State."

ROAD BUILDING MATERIAL.

The Geological Survey has just issued "Bulletin No. 8, a Preliminary Report on the Roads and Road Building Materials of Georgia," by Prof. S. W. McCallie, Assistant Geologist. This is an extremely interesting and valuable work, in view of the important campaign for highway improvement that is being carried on in all parts of the country. The bulletin gives a carefully prepared history of road construction, and a number of chapters on approved methods of road building, etc., all of it adequately and attractively illustrated. The last half of the volume, with which we are mainly concerned, has to do with the road building materials found in Georgia. They are considered in three divisions, the Paleozoic, the Crystalline and the Tertiary areas.

The smallest of these divisions is the Paleozic, lying in the northwestern part of the State. It comprises an area of about 3,500 square miles, and includes the greater part of ten counties, all of which are well adapted to agricultural purposes. The rocks of the Paleozic area consist of limestone, shale and sandstone, originally horizontal, but now compressed into gentle folds, having a northeast-and-southwest trend. In places these folds have been so closely pressed that the strata have been broken and relieved by huge faults, some of which show a total displacement of several hundred feet. This characteristic structural geology of the region explains, in a great measure, the striking topographical features of the area. Its present configuration is due almost solely to surface erosion; but this, in turn, has been conditioned largely by the original folding and faulting of the strata, together with the relative position of the hard and soft rocks.

The Crystalline area is divided topographically into two distinct divisions: (1) the mountainous region, (2) the plateau region. The former division comprises several counties in the northern part of the State, east of the Paleozoic area, which are very mountainous. Many of the higher peaks reach an elevation of more than 4,000 feet above sea-level.

The underlying rocks are chiefly contorted mica-schists, gneisses and slates, whose uneven weathering has had much to do with shaping the topography of the region. Road building in this mountainous part of the State is both difficult and expense; and, as a consequence, the highways are

generally in bad condition for traffic. The valley roads are sometimes in fair condition; but even these often have steep grades and are difficult to maintain, on account of the frequent overflow of streams. The plateau region of the Crystalline area embraces all that part of the State lying north of an irregular line, connecting Augusta, Macon and Columbus, with the exception of the Paleozoic area and the mountainous region of the Crystalline area, just described. This portion of the State known as the Piedmont plateau, is the southern extension of a wide and fertile undulating plain traversing the Carolinas and Virginia. It is the remnant of an old worn-down mountain range, whose peaks and ridges once towered several thousand feet above the present land surface, and probably reached, in places, the height of perpetual snow. A few fragments of this elevated region are still to be seen, as isolated peaks, widely distributed over the plateau. The underlying granites, gneisses and mica-schists of the Piedmont belt are generally decomposed on the hills and ridges to considerable depths, so that the actual cost of grading is reduced to a minimum. Material of good quality for macadamizing purposes is abundant throughout the entire area.

The Tertiary area, comprising all the Coastal Plain, lies south of the Crystalline area, and embraces more than half of the entire State. It is, generally speaking, a comparatively level plain sloping generally to the south. Many streams traversing this area are of large size.

The topography of the Tertiary area or the Coastal Plain is very favorable for highway construction. The most serious difficulties in the way of road building are the numerous swamps and the low depressions along the larger river valleys, where the roadway has to be elevated in order to insure proper drainage. Grading throughout the entire area is reduced to a minimum by reason of the flatness of the country, yet there is usually sufficient variation in the surface to carry off all surface water.

The limestones of the Paleozoic area are very abundant, and are well suited for macadamizing purposes. They are all of Silurian age, and are divided geologically into three divisions—the Knox Dolomite, the Chickamauga Limestone, and the Bangor or Mountain Limestone.

The Knox Dolomite is the most extensive of the three calcareous formations. It attains a thickness, in places, of more than 3,000 feet, and occurs in the form of a number of broad and narrow bands, traversing the area in a northeast-and-southwest direction, giving rise usually to broad, rounded ridges. The formation consists largely of compact, heavy-bedded, light-gray magnesian limestone, often oölitic and always containing a considerable amount of siliceous material, in the form of chert, hereafter to be described. The silica present is in the form of flinty or cherty concretions, unevenly distributed throughout the various beds. These concretions sometimes occur in such abundance as to form well defined layers, two feet or more in thickness. When the dolomite weathers, the flinty or cherty material remains with the residual clay, forming a mantle many feet in thickness. Where the siliceous material is not abundant, the weathered product is usually a very tough, red, tenacious clay, which forms a very unsatisfactory roadbed during wet weather. The Knox Dolomite has been used to a limited extent through-

out the Paleozoic area for road macadam; but its most extensive use, up to the present, has been for constructing retaining walls, bridge piers and culverts. It has also been much used in places, notably Graysville and near Cartersville, for making lime. The uniform texture and the semi-crystalline structure of the dolomite well suit it for macadamizing purposes. It would indeed be a difficult matter to find a calcareous deposit better adapted for road material than some of the beds of this formation. The stone is easily quarried, and is readily crushed by the rock-breaker; but it has, at the same time, sufficient toughness to form a durable wearing-surface. Its binding quality is all that could be desired for a first-class road material.

The Chickamauga limestone overlies the Knox Dolomite. It occurs in the form of narrow bands, more or less parallel, and often valley-forming. The formation is so called from Chickamauga valley, where it reaches its greatest development. Its various beds differ considerably, both in physical structure and mineral composition. Dr. C. W. Hayes, of the U. S. Geological Survey, in describing the formation says:

"It is, in its western exposure, a blue, flaggy, highly fossiliferous limestone, with some local variations of minor importance. From the eastern edge of Lookout Mountain there is a gradual and uniform change toward the southeast. The change consists in a decrease in the abundance of fossils and calcareous material and an increase in argillaceous matter. The limestone becomes more earthy, and along the eastern edge of the area is red or dove-colored and sparingly fossiliferous."

In the vicinity of Rockmart the Chickamauga formation becomes highly argillaceous and forms a good quality of roofing slate. Much of the Chickamauga limestone weathers into a shale, having a knotty structure. Such material is often used for road-surfacing, without being crushed; but its wear, on account of its fragile nature, is usually unsatisfactory. The compact, blue variety of this stone, on the other hand, makes an excellent macadam. It has been extensively used for this purpose both in Chattanooga and in Chickamauga Park. The City Engineer of Chattanooga, in speaking of this material, says: "I regard this stone superior to any material so far tried on our streets for macadamizing purposes. It binds well, is comparatively free from dust, and makes a hard, smooth road surface." The Chickamauga limestone varies from 1,000 to 1,800 feet in thickness, and is the underlying rock in many of the narrow, fertile valleys of Northwest Georgia. In weathering, it forms a deep clay soil usually difficult to drain; and it makes a very unsatisfactory road surface in wet weather.

The Bangor or Mountain limestone, which is of Carboniferous Age, is a pure, dove-colored limestone, attaining a thickness of about 900 feet. It is highly fossiliferous, and contains, in places, crinoid stems in great abundance. The formation is well exposed along the flanks of Pigeon and Lookout mountains, where it outcrops beneath the sandstones. Its use for macadam in the vicinity of Chattanooga shows that it is well suited for road construction.

The chert deposits of the Paleozoic area are quite extensive, and are widely distributed throughout the area. They occur in two different geo-

logical formations, namely, the Knox Dolomite and the Fort Payne chert, the latter formation being the lowest member of the Carboniferous formation. The chert of the Knox Dolomite is co-extensive with the dolomite itself, and is by far the more important deposit of the two, both from a geological and an economic standpoint. It occurs, as previously stated, in the dolomite in the form of nodules; and also in beds, frequently several feet in thickness. In the weathering of the dolomite the chert remains as a residual product in the form of gray flinty nodules. This siliceous material frequently accumulates to the depth of many feet, along the sides and slopes of ridges, where it is often well exposed in railroad cuts. The chert of the Knox Dolomite is an impure variety of flint, frequently containing more or less calcareous material, and is readily crushed into sharp, angular fragments. It has been extensively used for several years for surfacing roads and streets throughout North Georgia and Tennessee. The material is well suited for roads of light travel, but where the traffic is heavy it is inferior to limestone. It possesses an excellent binding quality, but after long drought and much travel it becomes somewhat dusty. In cities this difficulty can be readily overcome by sprinkling, which causes the loose particles to unite into a solid bond, forming a compact, smooth, dustless driveway. The cheapness with which this material can be compared, together with its admirable binding qualities, makes it one of the most important road surfacing materials in the State.

The chert is often most favorably located for working and for transportation. The railroads traversing the northwestern part of the State have frequently exposed in their cuts immense deposits of this material, almost entirely free from clay and other foreign materials. In such favored localities it can be loaded on flat cars at a nominal cost and shipped to any part of the State. This experiment has been tried in the last few years, and, in a few instances, the material has been shipped as far south as Macon, and even to Savannah, where it was used for street surfacing. With reduced freight rates, the cherts of the Paleozoic area of North Georgia can be shipped from 100 to 200 miles and sold at a less price than broken stone. The wide use of this material in the future will no doubt depend, in a great measure, upon freight rates.

The Fort Payne Chert is a siliceous limestone, varying in thickness from 50 to 200 feet. Its lower layers consist largely of heavy beds of chert, resembling very closely the chert of the Knox Dolomite. This formation, like the Mountain Limestone, occurs along the base of Lookout and Pigeon mountains. It also appears along Taylor's Ridge and Horn Mountain, further east. The siliceous nature of the formation is well exhibited along the Southern Railway, about one mile south of Sugar Valley Station. The chert here forms a heavy mantle along the base of a ridge, which, in places, must be many feet in thickness. Some distance up the side of the slope is to be seen, in an excavation recently made for road material, the natural outcropping of heavy beds of chert. The surfaces of the different layers are usually very rough, being full of irregular cavities, which are evidently due to the weathering of the calcareous material formerly filling these spaces.

The chert of the Fort Payne formation is usually distinguished from the Knox Dolomite cherts by its numerous fossils. It is, in places, very fossiliferous, being made up largely of the stems of crinoids, which are cemented together by a siliceous matrix. The siliceous material of these two formations apparently possesses about equal merits for road surfacing. However, the wide extent and the abundance of the Knox Dolomite makes it far more important as a road building material.

The shales of the Paleozoic area are of but little economic importance as road building materials. However, the shales in the vicinity of Rome have been used to a considerable extent for road surfacing. This material makes a fair road surface; but it is objectionable on account of its rapid wear and dusty condition during the dry season, especially when there is much travel.

Siliceous gravel, which results from the weathering of the shales, often occurs in considerable abundance along the small streams traversing the shale valleys. This material has also been used to a limited extent for road surfacing in the vicinity of Rome. It wears fairly well and makes a more durable and dustless road covering than the shale itself.

The limestones and quartzites of the shales are suitable for road metal, but their limited quantity practically prohibits them from ever becoming more than of local importance.

THE CHANCE FOR AMERICAN STONE-WORKING MACHINERY ABROAD.

ALL of the reports of the condition of the stone trade abroad that have been published for the last year have been to one effect, namely, that while there may be occasional improvement, the situation is such as to cause serious alarm to the producers. Much of the unsatisfactory state of affairs is attributed to the general financial depression and to the war in South Africa. While it is hoped that these will pass away, the stone producers do not blind their eyes to the fact that they must expect serious competition from this country. They have, therefore, set themselves to work to seek out methods of relief. The frankest and most intelligent of those who have given study to the subject realize that much of the fault is due to antiquated methods. It is said that a distinct improvement is already to be noted and that the quarrymen and stone workers evince a greater readiness than ever before to adopt modern machines, tools and other methods. This should be the time, therefore, for American machinery makers to do good missionary work.

As bearing upon this subject I have read with interest an article from the regular correspondent of the "Master Builders' Association's Journal" of Liverpool, who deals with stone, granite and marble. This writer says:

"At one time the introduction of machinery for the working of granite was viewed with great disfavor by the workmen employed, who believed that it would reduce the demand for labor, but the fact is the granite trade of the country could hardly exist to-day were it not for the improvements in

machinery, which have greatly reduced the cost of work. It is certain it could not have attained its present proportions had not the manufacturers been careful to equip themselves with the best appliances for the rapid and cheap production of finished material. The introduction of machinery, so far from being an injury, has been of enormous benefit, not only to employers, but to workmen also.

"A recent visitor to Aberdeen, who had not been in that city for two years, says he was much struck by the great improvement which has taken place during that period. Two years ago the general type of factory was a ramshackle shed, with machines and men crowded together, the men working in slush over their boots, and everything in a condition of general disorder. Now this type of factory is fast disappearing, and in its place workshops have been built containing the most modern machinery, with cutting and grinding tools, and factory and yard lighted by electric light.

"The same correspondent says that although most of the work seems to be done day-work, the men stick to their work in a better and more businesslike manner than is the case south of the Tweed, and several employers assured him that it was a rare case to hear of a man leaving work in the middle of the day to start on a drinking bout. Aberdeen masons who have been sent to English towns have more than once expressed their astonishment on their return at the way in which they have found men in the building trade stop every hour or so to get "refreshment." The whole system of work appears to be conducted on a more strenuous principle than in England.

"This is only another indictment against the average English building trade operative. On the other hand, the building manager to the British Westinghouse Company, in a remarkable letter to 'The Times,' published last month, states as a result of his experience that English workmen do as much as the workmen of any other country, if they are properly handled. He claims that in the building of the firm's new works at Trafford Park he has been able to get English masons to lay an average per man per day of say nine hours of 1,976 bricks; but this has been made possible by 'facilities which are unusual in this country.' These facilities appear to have been the rapid feeding of material to the men engaged and the method of making mortar. The mortar is described as being softer than that commonly used in England, the bricks being laid by a light pressure of the hand and a light tap of the trowel, instead of repeated hammering on the brick with the trowel to get it into place with stiff mortar.

"By the use of this soft mortar the Westinghouse manager says he can get mortar enough laid on with one stretch of the trowel for from half a dozen to a dozen bricks. The stiff mortar such as the masons use in this country enables them to spread only enough mortar at one time for a much smaller number of bricks, as the stiff mortar leaves the trowel in a mass and will not spread freely. All the men, including the foreman, were British workmen and members of the trade unions. The rate paid was 11½d. per hour, that is, 1½d. per hour above the trade-union rate. In the United States the men's average per day is from 2,000 bricks on the best-class work, say,

private residences, to 2,500 and even 2,700 on other structures. British bricklayers who go to America work side by side with the American bricklayers and equal their average.

"The conclusion at which the British Westinghouse manager arrives is that to successfully handle British workmen in Great Britain the men must satisfy themselves that they are to be paid good wages, and the man who has general charge of the work must understand his business, have the work done in his own way, in his own time, and by his own methods. These statements have been vigorously assailed, and the results obtained declared to have been impossible; but it appears that a record was kept of the work done by each man per day, and the sheets have been examined by an independent correspondent, who confirms the statements made. Further, a statement is given showing the average number of bricks per man per day, on each of the days from Feb. 1 to Feb. 24 inclusive. It is difficult to see how these circumstantial statements can be controverted."

No excuse is needed for reprinting this quotation. I am sure that American machinery makers will find it suggestive. It shows a remarkable awakening, not only in the stone industry, but in all the building trades. If we are to reap the benefit from this condition of affairs, it is not enough that we should sit quietly and await a demand for our products, but we must go ahead and conduct a vigorous campaign. The writer that I have quoted above gives his attention to one narrow branch of the stone industry only, the Aberdeen granite working trade. Here, of course, is a field for our pneumatic tools, surfacers and polishers. But the campaign should not be carried on in Aberdeen alone. At the present time that city has almost a complete monopoly in granite working. This is due to the fact that heretofore the main supply of granite was obtained from the quarries of Aberdeenshire. It has frequently been pointed out in these columns that the Scottish quarries are nearing exhaustion or have reached such a depth that the large blocks of stone needed for building and heavy masonry can scarcely be raised at a profit any longer. The builders and monumental men have been compelled to go elsewhere for their granite, and there has been an unprecedented demand for the fine Swedish granites. New quarries have also been opened in various parts of Great Britain, largely in Ireland, where the stone is of the highest grade, and also in many of the islands lying off the coast. But all of this stone is sent to Aberdeen to be finished, because of the utter lack of facilities at the quarries. If it were only to save the extra freights it would be desirable to change this system. But more than this is to be noted. The granite producers are growing very restive under a method that compels them to sell their rough stone at a very small price, while the major share of the profit goes to the Aberdeen workers. I believe that every one of these quarrymen would be glad to listen to arguments for the installation of a finishing plant. In fact, I know to my own personal knowledge that many of them are already making inquiries and investigations on their own account. No matter what their nationality may be, I am convinced that they will not view American machinery in the narrow provincial spirit once manifested abroad toward everything that came from this country.

They are thoroughly familiar with the wonderful progress that has been made in the granite industry in America, and they are not so dull but that they can see that much of it must be due to the aid given to the quarrymen by the machinery maker.

More attention has been given to granite than to any other branch of the stone industry in recent discussions on the subject, but the field is just as inviting for the American machinery maker in the soft stone trade. We are accustomed to laugh at the quarrying methods that are found at Carrara, but just as antiquated methods can be found among the sandstone and magnesian limestone quarries of Great Britain. Of course, exceptions must be made of some enterprising quarries, such as those producing Bath stone, which are generally up to date. The ordinary method that is followed, however, is to blast out immense ledges of stone and then break these up into commercial sizes. This is precisely the method that was followed in many of the American brownstone quarries years ago, and that was long ago discarded in favor of more scientific and economical methods.

England has a large variety of stones that are especially suited for quarrying with the channeler, such as Bath, Portland, Beer, Clunch, Painswick, Mansfield, York, Chilmark, Hamhill and Hopton Wood stones, and yet more channelers are used in Bedford alone than in the whole of Great Britain. I am aware that this is partly due to the fact that English channeling machines have proved unsatisfactory in many instances. But if an American quarryman finds one machine unsatisfactory for his purpose, he will try another, and we cannot but believe that the Englishman will do as much. It is not alone in channeling machines that a demand should be found. All sorts of American quarrying appliances would doubtless be adopted if their efficiency in working English stones was thoroughly demonstrated.

In elevating and conveying machinery there is also a fine field abroad. In the article that I have quoted above, Manager Stewart, in charge of the Westinghouse plant, speaks of the necessity of the rapid feeding of material to the men in order to get satisfactory results. Not long since the Home Office issued an illustrated circular describing approved machinery for building operations. As far as it went it was excellent in its suggestions. But an American could not but be astonished that many devices in wide use here are apparently unknown abroad. Not a reference was made to the many forms of elevators and conveyors by which we send material to workmen on buildings. The English contractor evidently puts up a few ropes and tackles, by means of which he laboriously hoists crates and baskets of brick and mortar, slate and the like, and is satisfied with this.

To read English advertisements and catalogues one would think that our brethren across the sea were fairly well provided with approved machinery. The only trouble is that much of the machinery will not bear comparison with American apparatus in speed of work or general efficiency. I recently met a quarryman from the other side who had installed an English aerial tramway. Perhaps it did all that was claimed for it, but the owner was very much disappointed with the results. He was an enterprising fel-

low, however, so he came to this country to see what could be done. He talked the matter over with an American manufacturer and received a guarantee that an American engine and dumping device could be adapted to the existing tower and cables that would do at least twice as much work as the present English plant. Here is one good customer secured for American machinery, for he more than hinted that he was convinced that American derricks would give better service than the English ones he is now using. But we cannot expect that these customers will come over here to buy. I believe that an outfit of quarry machinery, with a bright and competent American to demonstrate it, could be sent to England and would not only attract wide attention, but would result in the booking of many orders.

GEORGE BARNUM.

UNEXAMPLED BUILDING ACTIVITY IN NEW YORK.

IT may be doubted whether in any city in any age there has been such building activity in all lines and such an amount of public work as can be recorded in New York now. The construction of the Rapid Transit subway and the work that is being done at Croton and Jerome Park for the improvement of the city's water supply are undertakings of such magnitude as would give the year distinction, but in addition to these there is a vast amount of work planned or in progress, in bridge building, in pier and dock construction, in street improvement and the like. What is being done in the erection of immense and costly public and private buildings has never before even been approached. It would, perhaps, be a conservative estimate to say that $50,000,000 would not represent the amount involved in the public and office buildings now in actual course of erection. Not a day goes by without the announcement of some projected structure, or the purchase of a site. The people who are planning these buildings are constantly growing more daring in their schemes. It would seem as if the limit of size had already been reached, and yet companies are endeavoring to purchase entire blocks for the erection of single buildings that would dwarf any existing structures. One man came forward with a scheme for a fifty-story building, and all that he needs in order to transform his plans from paper into stone and steel is a mere trifle of ten or twenty millions. It requires no vivid flight of the imagination to picture the realization of such an idea within the next decade. It is reported that a syndicate offered the sum of $5,000,000 for the block upon which stands St. Paul's Chapel and the Trinity Corporation building, the intention being to erect a vast office building with many novel features. That the offer was not considered for a moment, goes without the saying, but the significance of it is that the syndicate is said to have been made up of foreign gentlemen, and that it indicates the vast amount of capital that is available for building operations in New York.

One feature of all this constructive work that must prove a satisfaction to those who desire the architectural advancement of the city is the free use that is being made of stone. A few years ago a large amount of terra cotta

would have been employed in any such extensive building operations. But as one calls over the list of notable new buildings now going up, it will be found that they are almost wholly of granite, marble, limestone or sandstone. Even where brick is used for the upper stories, the trim is almost invariably stone. The effect of this use of the richest and most durable material, especially as it is carved with an elaborateness found in modern work nowhere else, will soon be to make New York the most beautiful and striking city architecturally in the world.

Perhaps the most important of the new buildings is the United States Custom House, which is to have a site worthy of its magnificence. Situated at one side of Battery Park and directly across the foot of Broadway, it will dominate lower New York, even if it does not tower to the height of some of the sky-scrapers in the neighborhood. The architect, Mr. Cass Gilbert, calls for the most elaborate and beautiful stone work, not only in the granite exterior, but also in the interior decorations, where the rarest of marbles are to be employed. Only the foundation courses are set as yet, but these make use of massive blocks of absolutely flawless granite. It may be doubted whether any of the Scotch granite quarries would undertake to deliver the number of monster blocks that will be required in this one building, and yet the production of the stone is only a single feature in the quarrying operations of one State that does not even rank first in its granite output.

Another magnificent granite structure, in a more advanced state, is the Hall of Records, at Chambers and Centre streets. This is the crowning work of the late John R. Thomas, and there is every indication now that his splendid creation will not be marred by political trickery and favoritism. The exterior is entirely of Hallowell granite, and there are now being placed in position the first of thirty-two huge monolithic columns. One already placed is a little over thirty-six feet long and four feet wide. It weighs twenty tons, and it took a large force of men three months to quarry it. Others to be set later will be even larger than this. The interior of this building will also be decorated with rich marbles.

One of the most striking of the new granite buildings now in process of erection is the Hanover National Bank, at Nassau and Pine streets. The facing of the entire eighteen stories of this building will be of pink Milford granite, and no expense will be spared to make it one of the most substantial and beautiful of the New York skyscrapers. The work on the foundations, just completed, has been very elaborate, as caissons were sunk to the bed rock. The total cost of the building will be $2,000,000.

Three new buildings of marble call for attention and emphasize the beauty and growing favor of this stone as a structural material. The most important of these is not enough advanced as yet to permit of detailed description. The New York Public Library has one of the choicest sites in the entire city, at Forty-second street and Fifth avenue, where the old reservoir was for so many years a picturesque feature of the city's architecture. The design provides for one of the most imposing of all New York's public buildings, and when it is completed it will give a distinction to a portion

of the city now devoted almost wholly to commercial and residential buildings. Messrs. Norcross Bros., the contractors, are to use white marble from South Dorset, Vt.

The new Stock Exchange on Wall, Broad and New streets, will soon be ready for the roof. It will represent an expenditure of about $2,000,000, and it it said that two years were spent in perfecting the drawings and detailed plans. The entire exterior is of Georgia marble, one of the most durable and beautiful stones of its class in the world. Both on Broad and New streets the façade has huge columns nearly eighty feet in height. These are not monoliths, of course, but built up in drums. The Broad street columns are fluted, while those on New street are round. Messrs. B. A. and G. N. Williams are doing the stone work, which will be wonderfully impressive in its dignity. The interior will be finished in a white marble native to the State, quarried at South Dover. The building will represent the most improved methods of engineering construction. There will be four stories underground, rectangular caissons, making a solid wall, having been sunk to bed rock. The ceiling of the board room will be carried on huge steel girders, each of which weighs 130 tons.

On Liberty street the new Chamber of Commerce is nearing completion. It is to be regretted that a building of such unusual richness and magnificence could not have occupied a Broadway corner. The material is of West Rutland white marble, and there is a profusion of carving. Enough of this has been cut to show how it will set off the classic façade. If a single criticism may be ventured, it is to be regretted that so pronounced entasis has been given the columns. Against the plain white background of the wall it does not show so much, but in the corner columns it surely appears unduly exaggerated. We believe the proper province of entasis is merely to correct an optical illusion. When it goes beyond this it defeats its purpose.

The office building at No. 68 William street, just completed by the Thompson-Starrett Company, is interesting for several reasons. In the first place, although a fifteen-story building, it comes pretty near to establishing a record for rapid construction. It has been completed in the wonderfully short space of time of seven and a half months. In the second place it is as nearly fireproof as human ingenuity can make it, all of the woodwork having been treated by an electrical process for that purpose. The lower stories are of Indiana limestone, with adequate ornamentation. The cost of the building, exclusive of the site, was about $800,000.

Another building in the lower part of the city that is nearing completion and that has established a record for rapid construction is the Century building at 72 Broadway. This is one of the most valuable sites in the city, and exclusive of the ground the building will cost about a round million of dollars. The structure is twenty-two stories in height. The lower stories are faced with limestone, while the upper portion is of brick. The structural steel for the building was all delivered at one time, and to avoid the expense of storage the work of putting it together was rushed, with the result that the steel construction was completed in five weeks.

The Broadway-Maiden Lane building, which will be ready for occu-

pancy by May 1, will be one of the centers of the jewelry trade of the town. It is a dignified and imposing structure, erected by the George A. Fuller Co. at a cost of about $1,000,000. The lower stories are of Indiana limestone, containing some excellent and elaborate carving.

This by no means completes the list of the downtown buildings, for there are a score of other structures, such, for instance, as the two large buildings on lower Wall street that are worthy of mention. The tremendous growth of the city is shown by the fact that there is just as great building activity uptown. A few years ago the skyscrapers were confined wholly to the lower part of the island, but now they have invaded Fifth avenue, and line that thoroughfare from Fourteenth to Twenty-third streets. One of the most striking of the new structures is going up on the so-called "Flatiron," at the junction of Fifth avenue, Broadway, Twenty-second and Twenty-third streets. This will be twenty stories in height. The first four stories will be of limestone, and above this brick and terra cotta will be used. The building will contain 170,000 square feet of space, and will represent an investment of about $5,000,000. The Fuller Company has the contract.

On Broadway, facing Union Square, a magnificent banking building is being erected for the Bank of the Metropolis. This will be of granite, a stone fitted above all others for a bank building.

The new Macy store, at Broadway and Thirty-fourth street, while only nine stories in height, will have a total floor space of nearly, if not quite, 1,000,000 square feet. The first story will be faced with granite. Above this will be several stories of limestone, while the rest of the building will be of brick and terra cotta. Novel features in the construction are that there will be at least thirty elevators, and that the escalators will run to the third story. The building and site are said to represent an investment of between $5,000,000 and $6,000,000.

The Æolian building, on the site of the old Stewart mansion at Thirty-fourth street and Fifth avenue, the Thompson-Starrett Company contractors, is intended to be a high temple of music. Most of its twelve stories above the two first floors are to be made into studios for musicians. The exterior of the building will be elaborately carved. The cost is estimated at $650,000.

An important public building in the upper part of Fifth avenue is the new Mount Sinai Hospital, which is being erected on that thoroughfare at 100th and 101st streets. It comprises ten buildings, the most important of which range in height from 90 to 100 feet. The administration building, which faces on 100th street, has a stone front of impressive design. The private hospital is at the Fifth avenue side, and the kitchen and other minor buildings are in 101st street. The operating rooms will be among the most striking features of the hospital. The boilers, six in number, will be underneath the interior court, and the institution will have its own electric plant. There will be five dynamos, and the fourteen elevators will be operated by electricity. Norcross Brothers are the contractors, and they expect that the hospital will be ready for patients by Jan. 1 next. The cost of the construction work is estimated at $1,500,000.

Although New York is very well provided with hotels and apartment

houses at the present time, an immense amount of money is being expended on the erection of further buildings in this line. At Broadway and Seventy-fourth street Mr. W. E. D. Stokes is erecting the Ansonia, at a cost of between $5,000,000 and $6,000,000. The hotel is sixteen stories high and occupies a whole block front. It is said to be Mr. Stokes's intention to make it the most ornate and luxurious dwelling place in America, and tenants will have the privilege of paying as high as $20,000 a year for apartments there.

The St. Regis is being built for John Jacob Astor at Fifth avenue and Fifty-fifth street by the Thompson-Starrett Company. The exterior decorations of this building are most elaborate, the ornamental work having been carried out from designs made by a member of the Beaux Arts in Paris. This artist was brought from Paris to this country for that special purpose, his work having been done in conjunction with Trowbridge & Livingston, the architects. The St. Regis is eighteen stories, and the stone work is now nearly complete to the roof. By reason of its height the building dominates the entire neighborhood. The plans provide for a restaurant, palm garden and dining room on the first floor. The cost without counting the site is put at $2,000,000.

Another hotel job on which the Thompson-Starrett Company has just begun work is a towering annex to the Marie Antoinette, at Sixty-seventh street and Broadway. The annex, in fact, will be so much larger and so much more imposing architecturally than the hotel itself that the name will probably be transferred to the new building. It will be twelve stories high, with three stories of stone facing and the balance of red brick and white terra cotta. The design is of the most elaborate French Renaissance type, and the annex will cost no less than $1,000,000. When completed the Marie Antoinette will occupy the entire block front between Sixty-sixth and Sixty-seventh streets.

The same contracting company is also erecting the Algonquin apartment hotel in Forty-fourth street between Fifth and Sixth avenues. It is next door to the City Club's new house and will be twelve stories in height. The hotel is being built for the Puritan Realty Company, and will cost about $600,000.

Still another luxurious apartment hotel is the Leanori, which the Fuller Company is building at Sixty-third street and Madison avenue. It is twelve stories high and two stories underground. The front is of limestone, and the interior is finished in marble and mahogany. The cost of the structure is given as $700,000.

This article takes no account of the millions that are being expended in the erection of churches, club houses, public schools and residences for millionaires, among others for Andrew Carnegie and Senator Clark of Montana. But from what is of necessity an incomplete record it will be seen that, as stated at the outset, New York is now enjoying such a season of building activity as has perhaps never been equalled in the history of any single city. That this brings prosperity to the general stone industry goes without the saying.

THE PRESENT TASTE IN MONUMENTAL WORK.

SOME one has inquired facetiously, "What's the latest in tombstones?" Strange as it may seem, fashion determines the character of tombstones as rigidly as that of my lady's gown, says a writer in the "St. Louis Globe-Democrat." Perhaps the earliest form of memorial to the dead was the sarcophagus, and it is in a modified form the style which is most in favor in this country at the present time. Originally it was a huge stone box, fashioned to contain the mummies of Egyptian kings and persons of high degree. Later it was utilized by the Greeks, and was highly ornate and frequently a work of art. Then it was adopted by the Etruscans. The best preserved sarcophagi of the Etruscans are of terra cotta, which is practically indestructible. Upon the top were often modeled the statues of those whose remains were deposited therein, usually in a recumbent position. The Romans also adopted the sarcophagus as a memorial to the dead, and that of Scipio, preserved in the Vatican in Rome, is one of the most beautiful of ancient or modern times.

The obelisk, which, until within a few years, has been regarded in this country as the standard design for pretentious monuments, was first erected by Egyptian monarchs to commemorate their conquests, and it was not until comparatively recent times that it was adopted for memorial purposes. So great was the vogue for obelisks but a few years ago, and so enormous was their size, that some portions of our American cemeteries resembled manufacturing districts.

The earliest tombstones erected in the United States were of slate, and many remain standing in the older States which were erected 200 years ago. Sandstone was frequently utilized for this purpose, and it endures the trying climate of the North better than marble. Forty years ago marble was the material in almost universal use for tombstones and monuments. But it was discovered that it was very destructible, and that within a generation or so it would crack and disintegrate. Since that time granite has come into general use for monumental purposes. It is composed of mica, feldspar and hornblende, crystallized and fused by heat and pressure, and is so dense that a cube one foot square weighs 170 pounds and is practically impervious to water.

Space largely determines the character of monumental structures. The modern American cemetery, a beautiful park, is unknown abroad; consequently our great burial places are unrivaled in beauty. There has been a wonderful evolution in tombstones within a few years. The use of granite has changed their character, and as the park idea has been more fully developed, a higher class of memorials have been evolved. The first attempts at important monuments of this material outside of the conventional obelisk or shaft, were in most cases the apotheosis of ugliness. The hardness and stubbornness of the material rendered carving with the primitive tools of the stonecutter extremely difficult, but the demands of the trade and the invention

of the pneumatic tool has to a great degree overcome the difficulty, and now beautiful forms are rendered almost as deftly in granite as in marble. A higher order of talent has been called into requisition, and memorials are not uncommon which are artistic both in design and execution.

The mausoleum was so named from the Emperor Mausolus, who built himself a gigantic tomb of this form, fragments of which are preserved in the British Museum. This form of memorial is rapidly coming into favor among the wealthy classes in America. The old-fashioned side-hill, damp and gloomy vault is a thing of the past. The mausoleum of to-day is, or should be, wholly above ground, perfectly ventilated and lighted, and attractive without and within. The care which we bestow upon the last resting place of our loved ones is wholly a matter of sentiment, and there is a growing inclination among those who can afford it toward preserving the remains of their friends from the all-absorbing earth.

The largest mausoleum in the world is the Campo Santo at Genoa, Italy. It is a gigantic rectangular structure of marble, situated upon a hillside about six miles to the east. It is one of the most famous of the show places of that beautiful city. The building consists of a wall of white marble from the quarries of Carrara, which are but a few miles away. Upon this is a roof which on the inside is supported by square columns connected by arches. The interments are made through the floor. There is a line of stately monuments against the wall and another between the arches. The semi-tropical climate permits the use of marble, and the modern tendency to realism in Italian art has here run riot. It is said that there are spaces for 80,000 interments in the mausoleum and the ground which it incloses. In the center of one of the walls is a mortuary chapel with a flat dome, which has a wonderful echo. A conversation in an ordinary tone of voice will start a perfect babel of sounds which resemble a big organ gone crazy.

In this country the tendency is toward permanence in every form of memorial. Even the headstone of to-day is not a mere splinter of marble stuck in the ground, to topple or break off in a few years, but a block of granite, with butt extending below the post line and of such weight as to keep it in place. Iron fences and stone copings have been abolished, as well as high posts and headstones. Everything is forbidden which interferes with the park-like effect. In other words, "the latest in tombstones" is in the direction of beauty and permanence.

WET OR DRY CONCRETE.

IN a recent issue of the Journal of Western Society of Engineers, Mr. J. Hirtz describes some experiments made for a railway company to ascertain whether any advantage was gained by using concrete mixed rather dry. Authorities on concrete have differed very much on this point, some as the result of laboratory experiments having recommended that the water added should be kept down to the lowest possible amount, while others prefer

an excess of water. Actual practice has also differed, for inquiries showed that out of thirty-five prominent railroads, ten preferred a dry mixture, five a moderately dry one, sixteen a moderately wet mixture, and four a wet mixture. In the experiments referred to, the concrete consisted in each case of a part of Portland cement, two parts of sand, and five parts of stone. This was mixed by a Ransome mixer, and moulded into three-foot cubes. In the one case the water added was 82 per cent. of the volume of the dry concrete, and, as a consequence, the mixture was so wet that it was difficult to handle. In the other case the water added was 44 per cent. of the volume of dry mixture, and the heavy tamping was necessary to consolidate the concrete. The tamping was done on each six-inch layer. After thirty days it appeared that the wet concrete weighed 9.7 per cent. more than its fellow; it had, further, a much better surface, and on being broken, proved of much higher quality, the interior being a solid and compact mass, with the surface of fracture passing through the limestone and granite pebbles of the aggregate. The broken surface of the dry concrete block, on the other hand, showed numerous voids and pores, and a much higher percentage of stone and pebble "pulled out" in place of breaking. It is obvious from this that plenty of water should be added to the mixture in order to produce the best concrete.

To obtain perfect results in concrete one should have freshly ground cement of some well-known and established brand, coarse, sharp, clear sand free from all foreign matter, and hard stone crushed or broken to a size that will pass through a two-inch mesh, screened and washed free from dust.

Find by actual test how much cement it takes to fill the space in the sand. When the sand and cement is thoroughly mixed, it should occupy the same space that the sand did before the cement was mixed with it. For instance, if one barrel of cement and two barrels of sand are the proportions, when the cement and sand are thoroughly mixed dry they should just fill the two barrels. The same rule applies to the broken stone. The sand and cement mixture should fill the space in the broken stone. This must be found by actual test, but they will generally be found to be three parts of broken stone, two parts of sand, one part cement. The next question is, how much water is needed. This can be determined beyond dispute, in the following manner. Thoroughly mi with water so that when the mixture is put in place in layers of six inches and hammered with a paving hammer, the water oozes to the surface without any surplus to run off. This is perfect concrete with all the above conditions filled.

This is a leaf from an experience of 35 years with concrete in all conditions. J. B. Gordon.

Roscoe, N. Y

THE DOME AS AN ARCHITECTURAL FORM.

WITH a view to demonstrating the general æsthetic character of the dome and vindicating its place among the architectural forms suited for a Christian church, Prof. Baldwin Brown read a paper before the Edinburgh Architectural Association. He pointed out that the main characteristic of the dome in general was its embracing, uniting quality, and said it was important so to employ it as to obtain from it its full value as a unifying element in a composition. The employment of the dome as a mere roof, as in the multiplied domes of later Byzantine churches, such as St. Mark's at Venice, or the series of cupolas along a rectangular aisle, as in churches of the West of France, was not the way to secure all the advantages of that most beautiful and expressive feature. The dome, wherever it appeared, lent distinction to a building, and it had been rightly pronounced to be on the whole the most satisfying to the æsthetic sense of all architectural forms. The real power of the dome was, however, only exhibited when it was made to exercise an influence far beyond the limits subtended by its own circumference, and brought into harmony the complex elements of a subdivided plan. The Pantheon of Hadrian at Rome, the starting point of the development of dome construction in the modern world, completely embraced the spaces of the plan it surmounted, but this plan was that of a regular unbroken circle. The Christian builders desired to use the dome for their own purposes; but such a plan as that of the Pantheon was not suited for a Christian meeting house. One of the most interesting chapters in the whole history of architecture was occupied with various experiments made by early Christian architects to adapt the dome to plans suited to the requirements of congregational worship. Their efforts to overcome the difficulties which presented themselves were sufficient proof that they recognized the dome as a form not only beautiful in itself, but expressive of Christian ideas, and this was a consideration too often lost sight of by the Mediævalists of to-day, who, as the discussions connected with the new Liverpool Cathedral had shown, were still dominated by the ideas embodied in the Gothic revival of the first half of the 19th century.

Comment on Timely Topics

THE INCREASE IN STONE CARVING.

EVERY foreigner interested in stone work and architecture who makes his first visit to this country expects to have his attention centered mainly on the sky-scrapers of which he has heard so much. He doubtless comes with anticipations that these buildings will astonish him by their daring construction or that they will appall him by their ugliness. As soon as his eyes have traveled along the bewildering sky line and have wandered up and down the façades of many stories, he begins to look around at other features of our city architecture. Almost invariably what strikes him most is the profusion, elaborateness and beauty of the carved stone work in our commercial buildings and residences. Then as he enters the big buildings, he is astonished to see the free use that is made of the costly marbles for interior decoration. There have been many comments on these features from intelligent visitors, and this magazine has reprinted them for the benefit of its readers.

There is one style of stone construction that has made little headway in this country, and that is polished granite fronts. These are very common in the English and Scottish cities and are growing in favor in the Continental capitals. In Paris there is noted a large increase recently in the demand for polished granite for fronts, and Aberdeen is reaping the benefit of the change in fashion. But architects and builders abroad do not begin to use as much carved work as we, even in the soft stones, while it is doubtful if the whole of Great Britain can show as much carved granite in modern construction as New York City alone has. It is to be noted that a large part of the American carving is not the product of the ordinary journeyman stonecutter, but most of it is modeled and some of it is actually carved by sculptors of wide repute.

A short time ago an experienced granite man from Europe came to this country and gave a careful and appreciative study of the leading buildings of New York. Finally he stopped at the entrance of the National Bank of Commerce building at the corner of Cedar and Nassau streets. He studied the magnificent entrance in detail and regretted that the dullness of the day prevented him from taking a series of photographs of it. He enthusiastically declared to the writer that it was the finest job of granite carving he had ever seen, and he would defy any city in Europe to show its equal. The examples of artistic and elaborate carving in soft stone, in limestone and marble, are too numerous even to mention. Any city in the world might be proud of such architectural ornamentation as may be found in the Appellate

Division Court on Madison Square, the Chase National Bank, the St. Paul building, the Mail and Express, the Park Row building, the American Surety building, the Manhattan Life building, the Union Trust building and the new Chamber of Commerce.

That we have made such progress in ornamental stone work is the more surprising, inasmuch as we have not had the direct inspiration and stimulus from the achievements of former generations. The cities of the old world are full of magnificent examples of mediæval stone work, made at a time when the greatest of artists not only painted pictures and carved statues, but also gave their attention to the smallest details of architectural ornamentation. Of course, our architects and stonecutters have studied these classical examples, but they have not lived directly under their influence, nor have they copied them. They have, instead, originated styles perfectly fitted for modern purposes and yet as true to the best traditions of art as the early Italian examples.

Under the heading "Carved New York" an editorial writer of the "Sun" comments as follows upon this increase in artistic stone work:

"That the appreciation of New York for things artistic is growing is evidenced by the vast sums of money that are spent these days on the exterior decorations of buildings both public and private. The craze for severe plainness and architectural uniformity which found expression particularly in street after street of monotonous brownstone houses, each the exact counterpart of the other, has been succeeded by a desire for variety in design and for sculptural adornment. Thus the brownstone rows, especially in the so-called fashionable districts, have been broken up for the erection of more pretentious façades. The effect is to relieve the monotony and please the eye, as well as to give a distinctive character to the architecture of the entire neighborhood. Lack of room for adequate surroundings due to the almost prohibitive cost of land on Manhattan Island, will, of course, always be a bar to more ambitious architectural schemes, but the improvement wrought thus far in certain districts renders it certain that New York will never go back to the plainness of a generation ago.

"Even the speculative builders, who, by the way, have never received proper credit for their share in the upbuilding of the city, have caught the prevailing spirit, and most of the houses they offer for sale now are embellished within and without in a manner almost unheard of a quarter of a century ago, even in the homes of the very rich.

"The extensive and increasing use of costly carved stone is probably the most striking evidence of the improvement in the public taste. Scarcely a structure of any pretension, whether it be a private residence, a business block, a hotel, an office cloudscraper, or a public building, is erected these days which does not call for the services of the stone carvers. Ornamental terra cotta, the use of which was the first step in the break from the old-time baldness of design, is gradually disappearing before the demand for the more expensive and more substantial form of adornment. Many of the carvings and sculptural designs displayed on buildings here are handsome both in conception and execution. Some of the work is of a high order.

"The widespread demand for carven stone has led to the use of tools propelled by compressed air. It requires just as much skill to use them as the mallet and chisel, but the saving in time and muscular effort is almost beyond calculation.

"Gradually the feeling of respect and appreciation for professional skill and expert advice in matters pertaining to the parks and other public properties are spreading among the people, in spite of occasional outbreaks of well-meant but destructive ignorance. The day of haphazard blundering has gone by. The public eye has been educated to a standard demanding something better than architectural misfits or statues made by stonemasons."

The quarrymen who oppose the bill passed by the New York Legislature, to take Hook Mountain, just above Nyack, as a part of the Palisades Park, claim that their industry at this point produces hundreds of thousands of crushed stone yearly.

Dennis Roe, a well-known contractor of Trenton, N. J., and largely interested in stone quarries at Wilburtha, is dead at the age of 57 years.

James Chisholm, of Stockbridge, will open a new quarry on the Henry Harvey property at Munnville, N. Y.

Witcher Bros. have leased their granite quarries at North Conway, N. H., to Massachusetts parties.

Mrs. Victor D. Barner, of Allentown, has sold her quarries at Fogelsville, Pa., to O. D. Walters, of the latter place.

Columbus Grove, O., will vote on selling the township stone quarry. An injunction placed upon the quarry a number of years since restrains the trustees from disposing of any stone quarried there and allows the use of none but for township purposes. Consequently the quarry will be disposed of, providing the people express the necessary vote of willingness.

V. E. Wilder and L. O. Farrar have opened a stone quarry on the C. C. Pratt property, at New Milford, Pa.

The Maine Coast Granite Company, made up of Boston and New York men, has purchased a large amount of granite land at South Brooksville, Me., and will open extensive quarries.

Gonder & Brownback, contractors, who are doing an extensive job of railway construction in Reading, Pa., have leased a quarry at Conshohocken, from which they will take all the stone necessary for building walls and abutments.

A number of Waynesboro capitalists have organized the Blue Granite Co. to develop valuable granite quarries near Maria Furnace, Adams county, Pa. The offices and headquarters of the company will be in Waynesboro. The property is owned by Chas. McPherson, of Waynesboro.

Van & Brown, of Denver, have opened a stone quarry at Lyons, Col., and expect to ship at least ten cars of stone a day in a short time.

The firm of Atwood & Co. will open stone quarries and establish a crushing plant with a capacity of twenty cars a day at Wymore, Neb. They have secured a contract to deliver 50,000 tons or more of stone at Wymore to the Burlington road during the year. The material is to be used for railroad ballast. This company has operated a quarry at Cedar Creek, Neb., for twenty years and also has large works at Woodruff, Kan., and at Amazonia, Mo. The latter place is ten miles north of St. Joseph and is so situated that the firm can cover a territory of 700 miles and not ship a car a distance of over 100 miles. The Burlington road has just given the firm a larger contract for ballast to be delivered from the Amazonia quarry.

Two Italians exploded with their picks a blast that had missed in the quarries of the Osborne & Marsellis Co., at Upper Montclair, N. J. Both were fatally injured.

Francis J. Marley, of Paterson, N. J., has been awarded the contract for removing several blocks of solid rock on Seventh avenue, below the Manhattan field, in New York city. The contract involves an expense to the municipality of New York of several hundred thousand dollars and the time specified for the completion of the work is three years. Mr. Marley will have a stone crusher erected on the avenue in order that the rock can be handily removed.

J. W. McGeorge, of Clarksburg, is opening a stone quarry at Salem, W. Va.

Charles A. Sims & Co., of Philadelphia, extensive railroad masonry contractors, have purchased land two miles west of Curwensville, Pa., and will open extensive quarries.

Charles Bailey has been operating his quarries at Suncook, N. H., a large portion of the past winter.

Montreal has reopened the city quarry at Outremont, which has been idle for four years past. There are three crushers, which have just been put in order.

Two hundred and forty men have been laid off at the immense quarry at Corinth, Saratoga county, N. Y., where stone is being gotten out for the big dam at Spier Falls. About seventy-five men are retained. The work has progressed to such an extent that the stone can be quarried with less effort.

Flandrau & Stiles have opened two quarries at Emerick, N. Y., one for building stone and one for crushed stone. The firm has a big contract for street paving in Cohoes.

The prospects for the quarrying business at Bucyrus, O., for the coming season are believed to be unusually good. Both the Leesville Stone Co. and the Brokenswords Stone Co. are preparing their quarries for increased work. The latter company has recently installed a tramway.

E. Baldridge & Co., of Hollidaysburg, Pa., representing Pittsburgh capitalists, have purchased 400 acres of ganister stone quarries at Barre, Huntingdon county, Pa.

D. Brough and N. Wright have opened a new building stone quarry at Owen Sound, Ont.

Dubuque men are endeavoring to secure control of what is known as the old Dunkleberg stone quarry a mile north of Waterloo, Ia. The quarry has been idle for some time and is owned by a Mrs. Wilson.

Prices Paid for Stone Work in the Olden Times.

The ancient records of the city of Plymouth, England, contain many items concerning the cost of stone work in the sixteenth century. Here are a few entries:

1511-12. Itm to John the mason and Edward Salerman for iij tydes at the Cawsey ixd. A quarry broken within the new bulwark. The new Cawse mention and "grete stones" brought there. A dry wall made in the Castle from Old Town tower to Venar tower; and a new house put up at the Cawsey—mason's labourers had 6d. a dap as it was harvest time.

1517-18. It. pd. for castying doune and makyng ageyne of the oldewall by the Fryers lane and rydding in the strete there to ij workemen a grote vs. iijd.

1549-50. Itm pd to a man for his labour Rydyng to the quarrey to speke for stones for the Kyngs works at Alderney viijd.

Itm pd to John harreis for settynge uppe the ffredome stone betwene the toune and Stone-housse . . . . ijd.

1560-61. 36 perches of school house wall built at 10d. a perch.

1564-64. "Howe Chaple" mended; work on the Cawse. Many entries for an unnamed building total about £120. There were pillars; Arthur Champernoune had 40s. for pillars, and 27s. 8d. was paid for nine "more" stones for pillars. "More" stones brought by boat, and a load of "poppell" stones.

1569-70. Itm. for three piece of Cane stone sold to John dyer of Sent Stephens this yere . . . . . xvs.

1588-89. Item to Creasse for setting up of the freedom stone at lipson in Mr. Baron's ground, and for hewing of St. Androe cross in the stone foeing to Stonehouse . . xd.

1592-93. Itm pd for buyldinge of three Cundytts and bringinge of the water to the Guyldhalle in ledd cxlixll. vjd.

1593-94. Itm pd Christofer Taylor for buyldinge the watch housse at the becone uppon the West hawe xll.

1654-55. Mrs. Miller had £10 in lieu of stones promised her by the town towards buildinge her almshouses in the churchyard.

For Good Roads in New York.

Although New York passed the Higbie-Armstrong State Aid law in 1898, not much has been accomplished in road building because of a lack of adequate appropriations. The recent Legislature made possible the expenditure of $1,600,000, one-half of which will be borne by the State and one-half by the localities benefited. State Engineer Bond will soon advertise for bids for the construction of 186 miles of improved roads. Good road improvements are made in the order in which applications for the same are filed by localities with the State Engineer. In all, sixty-five roads are to be improved during the coming year, the number of miles in each county being: Albany, 8; Broome, 3; Chenango, 5; Cortland, 2; Erie, 25; Fulton, 5; Monroe, 49; Montgomery, 12; Oneida, 5; Onondaga, 7; Orange, 26; Rensselaer, 6; Rockland, 8; Schenectady, 2; Tompkins, 2; Ulster, 19; Washington, 7.

Marble and Granite

The Central Marble & Granite Works, of Reading, Pa., has the contract for the granite work for the Colonial Trust Co.'s building, in that city.

The new stone cutting plant being built by Fred Andres & Co., at Keefe avenue and Richard street, Milwaukee, Wis., will consist of a saw mill, 124 x 50 feet; a planer shed, 102 x 32 ft., and a stone cutters' shed, 38 x 58 ft. These will have the latest kind of stone cutting machinery. An engine and boiler house will be built containing a Corliss engine of 250 horse power. A traveling crane with a runway of 370 feet will pass through the sheds.

The monumental plant of George H. Carpenter at Berlin, Mass., was destroyed by fire.

Michael Dolan, long in the marble business at Hamburg, N. Y., and formerly connected with Foley Bros., of Olean, is dead at the age of 45 years.

W. G. Beebe, of East Dorset, Vt., has opened a marble shop at Manchester Center.

The Church of the Holy Cross of Harrison, N. J., will erect a $3,000 marble altar.

L. Mion & Son have opened a marble and tile works at 789 Broadway, Albany, N. Y.

The Woodbury Granite Co., who own and operate a large granite quarry in Woodbury, Vt., have bought the extensive plant and cutting business of Bickford, Moore & Co., of Hardwick. The officers of the new company are: John S. Holden, president; C. W. Leonard, vice-president; George Bickford, treasurer and general superintendent.

Philip Mindel, whose marble plant at Lyons, N. Y., was recently burned, has bought the Commercial Hotel property on Water street in that place, and will erect a new marble shop.

A. Black & Son, monument manufacturers, of Grand Rapids, Mich., have bought a lot at the corner of Division and Goodrich streets, in that city and will erect a two-story brick plant. Pneumatic tools and polishing machinery will be installed.

Joseph Moffet, one of the leading marble and monument dealers of Milwaukee, Wis., is dead at the age of 66 years.

The Lake George Marble Co., which has offices at 34 Warren street, Glens Falls, will install a plant at its quarries on the Schroon river in Warrensburg. This will include drills, saws and a rubbing bed. The company owns a deposit of fine, sound marble, admirably adapted for building purposes. Much of it has the appearance of gray granite, with a decided green tinge. The property has not be thoroughly prospected, as yet, but blocks have been obtained that show an attractive mottling of green and gray, that would be well suited for fine decorative work, especially columns. Samples of the stone can be seen in the office of this magazine.

James McWhirter, who has been prominently identified with the stone and marble interest of Atlanta for a number of years, has accepted the superintendency of the Atlanta Marble Co. and will have charge of the quarries at Ball Ground, Pickens Co., Ga. This quarry produces the celebrated Herndon Valley marble.

The granite working firm of Harrison, Wood & Co., of Belfast, Me., has been dissolved. Mr. Harrison's interests have been purchased by Mr. Heal, a member of the former company. The new firm will be known under the name of Heal & Wood.

Patrick Reagan, Jr.; James Toole, Jr., and Martin Ryan, Jr., have purchased the marble works of Joseph Cone, at Geneseo, N. Y. The business was established 35 years ago.

The Worden Bros. Monument Mfg. Co., of Dansville, N. Y., has been incorporated with a capital stock of $50,000.

A. H. Fegely, acting for Philadelphia capitalists, has purchased for $30,000 a 49-acre tract of land near Birdsboro, Pa., containing a deposit of beautiful granite. A quarry is on the property, but it has not been worked for some years. It is said that a stock company with a capital of $100,000 will be organized to develop the property and quarry granite for building, curbing and paving.

J. E. Burke and Jewett P. Cain, of Rutland, and W. B. Butler and T. R. Willis, of Pittsford, have leased the Orville marble quarries a short distance north of Clarendon Springs, Vt., for a period of 20 years. This deposit has been known for 57 years, and has changed hands a number of times. It has never been worked to any extent, however. It is said that fifteen varieties of marble are found on the property. Borings have been made and have disclosed about 30 feet of white, 118 feet of light

variegated, 60 feet of dark blue and 40 feet or more of nearly jet black marble. The vein ends in light and dark gray. Sound marble is found seven feet below the surface and tests have been made to a depth of 182 feet, with no indications of seams or cracks. Some of the cores removed are over 8 feet long. The new owners will form the Orville Marble Quarrying Co., and at first will sell blocks only.

Curtis R. Foster has purchased the granite and marble business and stock of the late N. H. Higgins, of Ellsworth, Me.

The Davidson Bros. Marble Co. at present employs 32 men at their plant on Water street Watertown, N. Y., besides 15 men at the Gouverneur quarries. As soon as conditions permit the Watertown plant will be run night and day.

The Winnsboro (S. C.) Granite Co. has a contract for a large 12-story building in Philadelphia and is anxious to secure a large number of additional cutters.

The Lostine Lime & Marble Co. has been organized in Lostine, Ore., to burn lime and get out marble for tombstones. The stockholders are: E. Reisland, B. O. Foster, C. E. Van Pelt and B. Foley.

The Buckeye Mineral Co., of Toledo, O., recently sent two representatives to Tennessee to investigate the marble lands it holds there under lease. One of the explorers, Walter Pickens, writes that all varieties of marble except black are found on the property.

Mrs. C. E. Rathbun, who has conducted a monumental business in Stockbridge, Mass., for the past eight years, has leased the business to John L. Snyder, for some years her foreman.

Carl Rittenmaier & Co. is a new granite firm that has located at 702 De Mers avenue, Grand Forks, N. D. The company does a general business in stone cutting and carving. They handle in the main the St. Cloud granite.

George W. Frost, aged 38 years, a member of the marble firm of George E. Hoare & Co., of Watkins, N. Y., committed suicide, while mentally deranged. He had been seriously ill for some time.

The Westfield Marble & Sandstone Co. has resumed work in its quarries at Westfield, Mass. The mill has been kept running all winter, but the supply of marble on hand is nearly exhausted. The company recently completed and shipped two large columns of green marble.

Judge E. A. Tucker, Rudolph Vertiska and Paul Kretek, of Humbolt, Neb., have purchased the Sky Blue Marble and Onyx quarry near Riverside, Cal. A stock company will be formed and development will begin at once.

The Hudson & Chester Granite Co. has in contemplation extensive improvements to its plant at Chester, Mass., this spring. A cutting shed will be built near the polishing shop and will be fitted with improved machinery.

A firm in Seattle, Wash., is shipping carloads of the decomposed granite found in that neighborhood for use as chicken grit.

The Chewelah Marble Co., of Spokane, Wash., has been incorporated with a capital stock of $150,000.

William Whyte, who for the past twenty years conducted a granite works at Penn avenue and Thirty-third street, Pittsburgh, Pa., is dead, at the age of 58 years.

The Washington Marble Co. has a force of 25 men at work in its quarries at Eakle's Mills, Md. The product is all shipped to New York.

E. A. McColly has bought the interest of his brother in the marble business at Latrobe and Ligonier, Pa., and will continue the business at both places.

John Smith, a well known granite cutter, has bought a shed at Milford, N. H., and will go into business on his own account.

The Granite Construction Co., of Manchester, N. H., has received a contract for the completion of the large Catholic Church at Montpelier, Vt. The church was begun in 1891 and will be finished this year at a total cost of $100,000. The company also has a contract for a large Catholic church at Fall River, Mass.

The Hudson Granite Co., of 1 Exchange place, Jersey City, N. J., has been incorporated with $100,000 capital, by Margaret A. Riley, Louis Ebert and Clarence Kelsey.

Hand and Machine Polished Marble.

Compare a slab of marble, hand polished, with one that has been polished by machinery, says Mr. Halsey Ricardo. In the first instance, the surface is full of life and movement, the light falls on its tiny depressions and irregularities, awakening wayward reflections, strengthening and palliating its colors, developing its lusters and translucencies, so that it becomes rich in story as well as in hue. In the other there is the dead level of polished surface, unassailably perfect, but comparatively speaking uninteresting. The life and vivacity of the marble are gone; it is merely a polished record, with the pleasant part of its individuality rubbed away into a wearisome uniformity.

Limestone and Sandstone

Mr. Rightmyer, of the firm of Rightmyer & Shute, which recently sold its quarries at Hudson to a cement company, has leased the Berridge quarry in that city and will take possession immediately.

There is a soapstone deposit, said to be of large extent and of the finest quality, on the property of Col. W. P. Sprutting, one mile from Oakbowery, in Chambers county, Ala.

Samuel C. Tussey has purchased property on Chimney Rock ridge, near Hollidaysburg, Pa. This contains a large deposit of limestone, and Mr. Tussey will at once open quarries.

Barney Marsh, who has the contract for the erection of a new concrete bridge, and William Horrabin, who has a contract for building the Dry Run sewer, at Waterloo, Ia., have made contracts with the Waterloo Stone Company for furnishing the stone. It is said that about 2,000 cords of stone will be needed for the two jobs. The stone company will erect a large stone crushing plant at the quarries, which are located a few miles north of the city.

The Montgomery & Shanley Stone Quarry Company has begun operations at the quarry near Brownsburg, Pa. About twenty carloads of crushed stone a day will be turned out.

Messrs. Travis & Kingsbury recently quarried at Steven's Point, near Susquehanna, Pa., a bluestone platform eight feet wide and twenty-eight feet long, weighing fourteen tons.

The Louisville & Nashville Railroad Company is operating a quarry half a mile south of Hartselle, Ala. It contains one of the finest deposits of sandstone in the South, and the stone is used for culverts and bridge piers. From two to three cars a day are being gotten out.

The Carroll County Sandstone Company, of Carrolltown, Mo., has been incorporated, with a capital stock of $15,000, by B. D., A. T. and O. A. Kendrick and William G. Bushby.

The Empire Limestone Company has been formed to establish a big crushing plant at Williamsville, Erie county, N. Y. The company has purchased 275 acres of stone land near that village, and will erect a plant that will cost in the neighborhood of $100,000. There will be 400 horsepower boilers, and a 175 horsepower engine for running the crushers, conveyors, sorting screens, etc. The system adopted will be to convey the rough stone as blasted to the crushers in steel dump cars. The first crusher installed will have a capacity of 1,000 tons per day, and is a five-jaw Morris crusher. The power for drilling will be compressed air, using a large Hall compressor. The company will furnish stone for flux to the Lackawanna Steel Company, at Stony Point, and will also sell crushed stone for all purposes. The officers are: Mr. E. L. Fuller, president, Scranton, Pa.; Mr. M. B. Fuller, secretary and treasurer, Scranton, Pa.; Mr. H. O. Duerr, general manager, Bethlehem, Pa.; Mr. T. M. Richards, superintendent of the plant, Scranton, Pa.

The Decker's Creek Sand and Stone Company, of Morgantown, W. Va., has been incorporated with a capital stock of $25,000. The officers are: George C. Sturgiss, president; Robert S. Vance, vice-president; Frank Corbin, secretary, and Emil Schultz, treasurer. The company will erect a plant on Decker's Creek about twelve miles from Morgantown. It will produce building and glass sand and crushed limestone.

The Brotherhood Contracting Company has purchased the Henlein farm, two miles south of Greenville, Pa., and will open extensive quarries. The stone is 99 per cent silica and is very strong. About fifty men will be employed at first.

Messrs. Reilly & Mix, the proprietors of the limestone quarry at Schoharie, N. Y., who are furnishing the stone for the new Catholic church at Albany, are installing a stone crushing plant.

T. J. Fleming is suing for an injunction to restrain J. D. Huey and a dozen others from entering upon and taking rock from the Sunset claim, near Oro Grande, Cal. Fleming claims to have owned the quarry mine known as the Sunset for ten years, and he asserts that he has a clear title to the land. But the defendants contest his right to the property, and insist upon their right to remove sandstone and other rock from the land whenever they desire.

Last year more than 2,000,000 tons of limestone were quarried in Pennsylvania, and nearly all of it was utilized within the State's borders. Blair was the champion county, with the product of more than 400,000 tons.

A suit for $11,000 has been filed by R. B. Kepley against the Gilfillan & Drake Flagstone Co. of Fort Scott, Kans. The suit is brought for an alleged violation of contract which the plaintiff claims he had with the defendant company. Mr. Kepley says that in 1899 he was given the exclusive agency of the company for the introduction of the stone for paving purposes in Topeka. According to the terms of the contract, he declares that he made bids on the city curbing for the years 1900 and 1901, securing many of them, and that he made another contract with the company last summer for the bids of 1902, and secured several of these bids. He further says that the company has removed him from the position of exclusive agent and that he can not get the stone specified in his bids, for the company controls the quarries, so that he will have to forfeit them.

A large deposit of limestone has been discovered five miles west of Neosho, Newton county, Missouri.

The Hudson River Bluestone Company has begun work on the erection of a large rubbing mill on the dock at Pouckhockie.

Judge James Maybury, of Clifton, has been made superintendent and general manager of the quarries of the Passaic City Brown Stone Company, at the head of Oak street, Passaic. Judge Maybury succeeds Cornelius Kevitt, who organized the company some years ago.

A. G. and G. A. Morris, of Pittsburg, have organized the Birmingham Lime and Rock Co., and are developing the lime rock formations at Calcis, on the Central of Georgia railroad.

The extent to which the limestone business in Berkeley county, W. Va., has grown is shown by the fact that on one day recently there was shipped from Martinsburg 103 carloads of stone. The shipment consisted of 86 carloads from the quarries of the Standard Lime and Stone Company, 14 from the Bessemer quarries and 3 carloads of ballast. At the quarries of the Standard Lime and Stone Company between 400 and 500 men are employed, while at the Bessemer quarries 150 men are now at work getting out the stone and getting the dirt off the fields in order to open new quarries.

O. C. Carter, general stone agent of the Monon, believes the year 1902 will be the best for stone business in the history of the oolitic belt, and that all the 35 quarries and mills along the line will be worked to their capacity. The Monon is prepared for the handling of stone without delay, as it owns over 2,500 stone cars, all of which are new or have been rebuilt.

M. F. Brooks has resigned his position as superintendent of the Salem-Bedford stone mill, at Bedford, and will conduct a stone yard in the north part of that city.

John A. Monk, who has a contract to furnish half the limestone for the Vesta furnace, has leased the old Benson quarry at Chickies, Pa., which has not been operated for 20 years past.

B. Nicoll & Co., of New York, have opened the old Fowler limestone quarry at Franklin Furnace, N. J. The stone is admirably suited for fluxing purposes.

The rock crushing plant which has been in operation at Cloverport, Ky., for some time, is to be removed to Webster, where there is a large deposit of oolite.

The Outlook for Medina Sandstone.

Winthrop L. Scarritt, treasurer of the recently incorporated Medina Quarry Co., which is a combination of the leading quarries in the Medina sandstone district, said in the course of a recent interview:

"It is an anomaly to modern commercial progress that a company was not formed years ago to operate these extensive quarry interests. For years they have been allowed to drag out a weary and almost useless existence under individual ownership and there is only one result of this peculiar condition of affairs, the usefulness of the quarries is practically unimpaired.

"There is enough sandstone in our 32 quarries now to permit of our taking out five times as much in each year as formerly and yet the supply will not be exhausted for the next 7,100 years. When we stop to consider that this sandstone is fireproof and infinitely harder than Quincy granite, of which the Bunker Hill monument is constructed, we can appreciate the value of our property.

"We do not intend to lower the price of sandstone at once. Of course it will cost us less to produce it, but our initial expenses have been heavy and we want to use our surplus profits at first in making our product much more popular than it is now. In time the price will drop. We will commence working the quarries under a full force of men in the spring and we will boom that section of the country such as it has never boomed before."

Stone Trade Notes

The manufacture of oilstones by Cheney & Eaton, at Manlius, N. Y., will be discontinued as soon as the present stock is finished, the business having been absorbed by the Pike Mfg. Co.

P. Schmidt & Co., cut stone contractors, who occupy about two acres of ground at Oakland and North avenues, Milwaukee, claim that they will be damaged to the extent of $75,000 by the proposed depression of the Northwestern tracks in that neighborhood. The chief engineer of the railroad has notified them that it will be impossible to provide sidetracks to the stone yard if the main line were depressed more than fourteen feet. This would leave Messrs. Schmidt without shipping facilities and would necessitate their removal to other quarters.

The Summit Stone Works, of Geneva, N. Y., wishes to float $30,000 in bonds in order to enlarge its plant and increase its business. The Geneva Chamber of Commerce will take the matter in hand.

The Maine Ice, Granite and Transportation Co. has been incorporated under the laws of New Jersey, with $500,000 capital, to market ice, carry on a cold storage business and quarry granite. The incorporators are Horace S. Gould, John T. Billings, Evan J. Dudley and K. K. McLaren, all of 15 Exchange place, Jersey City.

The Crescent Cement & Stone Co. has been incorporated in Colorado, with a capital of $100,000, by W. F., S. T. and M. S. Kendrick, to operate in Jefferson County, Col.

A new stonecutting company, under the management of John Monahan, of Newark, will establish a plant on Central avenue, Passaic, N. J. The company will confine its business to fancy stonecutting only. All its material will be taken from the Brown Stone Co.'s quarry.

The engine and boiler room in the stonecutting works of Fred Andres & Co., at 808-830 Canal street, Milwaukee, were damaged to the extent of $2,000 by fire recently. The company has just commenced to build one of the largest and best equipped plants in the west at Keefe avenue and Richard street, in that city.

The Casparis Stone Co. is building a large and finely equipped crushing plant at Marble Cliff, near Columbus, O., to replace the one recently destroyed by fire.

A new company has been formed to take over the business of the Duerr Contracting Co., which operates crushing plants at Williamsburgh and Reading, Pa., North Le Roy and Jerome Park, N. Y. The new concern is the General Stone Crushing Co., with a capital stock of $300,000. The officers are J. N. Porter, president, and John Rice, vice-president and general superintendent, both of Easton, Pa., and H. H. Mitchell, New York, secretary and treasurer. The company has a big contract for furnishing crushed stone to the Lehigh Valley Railroad for ballast.

All street work at Grand Rapids, Mich., has been tied up owing to the impossibility of securing crushed stone. Two crushing plants were operated in the city last fall, but the Common Council declared them a public nuisance and ordered them shut down.

It is said that the Callanan Road Improvement Co., with offices at Albany and main plant at South Bethlehem, N. Y., will establish a crushing plant at the Wemple quarry near Fort Hunter, N. Y.

The Tidewater Stone Co., of New York city, has been incorporated with a capital stock of $300,000.

Two new unions of workers in the stone trade are being formed in New York city—the Stone Cleaning and Pointing Association and the Artificial Stone Work Masons' Association.

James Robinson has purchased a large tract of land adjoining the Pennsylvania Railroad at Wilkinsburg, Pa., and will open a stone yard.

The Erie County Board of Supervisors will open a quarry and establish a crushing plant at the Almshouse.

The journeymen stonecutters of Alexandria and Anderson, Ind., have formed a branch of the International Union. They will adopt a schedule of 35 cents an hour.

Oscar E. Jones has been awarded the contract of furnishing stone for the city crushing plant at Middletown, N. Y.

William Gray & Sons, of Philadelphia, have made an amicable settlement of the trouble with the Pittsburgh marble cutters and setters, who struck last November while doing the marble work on the new Union station in the latter city.

The Grant Memorial Competition.

The committee in charge of the competition for the Grant monument at Washington has given the award to Henry Merwin Shrady, of New York, declaring that his design is "first in intrinsic merit and best adapted to the site indicated." The award created some surprise, as gossip had it that the committee favored the design of C. H. Niehaus, or the colossal equestrian statue by J. Massey Rhind. Mr. Shrady's model provides for a long terrace or platform, flanked by exedras at the ends. This terrace is to be about 260 ft. long and about 69 ft. deep and the platform will be about 5 ft. 4 in. above the ground. It will be reached by a series of broad steps, each 3 ft. wide. The terrace will be ornamented with three groups. An equestrian statue of Grant in the middle, surrounded by four great lions, and two bronze groups at the end, one depicting a charge of cavalry and the other a battery of field artillery going into action. A long balustrade at the rear and a carved balcony-like structure before the Grant group complete the adornment of the memorial. On the pedestal of the statue are bronze reliefs. All of the marble figures are to be of bronze, while the rest of the memorial is to be of white marble. Those who entered the competition were as follows:

Douglas Tilden, Oakland, Cal.; F. E. Triebel, New York; Franklin Simmons, Rome, Italy; Gordon B. Pike, New York; Melva Beatrice Wilson, Washington, D. C.; L. Amateis, Washington, D. C.; Waldo Story, Rome, Italy; Albert Jaegers, New York; Solon H. Borglum, New York; Washington Hull, New York; Cyrus E. Dallin, New York; Warren, Wetmore & Morgan, New York; H. M. Shrady, New York; Wilkinson & Magonigla, New York; Charles Henry Niehaus, New York; J. Massy Rhind, New York; Lopez, Robb & Hornbostel, New York; Burr C. Miller, Wilkesbarre, Pa.; W. W. Manatt, New York; H. K. Bush-Brown, Newburgh, N. Y.; John Francis Brines, New York; Max Bachmann, New York; John J. Boyle, New York; H. H. Kitson, New York; G. K. Thompson, New York; Cyrus W. Cobb, Boston, Mass.; John Donoghue, New York; Cutzon Borglum, New York; J. H. Freelander, New York; Caroline Shaw Brooks, St. Louis, Mo.

Work in the Welsh Slate Quarries.

There is considerable speculation among the slate men of Great Britain concerning the unexpected resignation of Mr. Meares, the acting manager of the Penrhyn Quarries, and the brother-in-law of Mr. E. A. Young, the chief manager. The "Slate Trade Gazette" says: The "official" reason given for his resignation is the ill-health of Mrs. Meares. The quarry continues to work and we are told that there is a steady increase in the output. The number of men employed is between 800 and 900, of which a little over 600 came out at the beginning of the dispute. Since their return in June, 1901, the remainder of the strikers have remained firm. Hopes are entertained in some quarters that a proportion of the 2,000 men still on strike will seek re-admission into the quarry at Easter. We see no foundation for such a hope. The leaders of the strikers seem as determined as ever, as are the majority of the rank and file still.

The quarries of Merioneth, especially those of Festiniog, are working full time, though the severe weather of January and February interfered somewhat with the men at work on the face of the rock. At Corris, Aberllefenai and Abergynolwyn, too, the output seems to have increased. When the falls which recently occurred in the Nantlle Vale mines have been cleared, as there is every reason to hope they will be soon, there will be a greater output at Carnarvon too. Just at present there is a temporary decrease in the number of tons shipped from Carnarvon. The Llanberis quarry under the new management is working steadily and the relations between master and men are all that could be desired.

At least two new slate mining companies have been formed recently with a view of developing quarries in Carnarvonshire. One of these is the Cambrian Slate Quarries, Ltd., with a capital of £15,000, with its registered office at the Cook and Ddol Quarry Llanberis, and the other the Snowdon Slate Quarry Co., Ltd., with a capital of £8,000. This latter company intends acquiring Clogwyn-y-Gwin Quarry at Bettws Garmon, where during recent years some good slate has been found, notably at Hafodywern. The wonder is that capitalists have not prospected more in the Merionethshire hills. There are some good slate beds in the Harlech district, where purple and dark blue stone is to be had in large quantities. Then between Festiniog and Bala some good slate may be found, which for some reason or other has not yet been brought into the market, presumably because capitalists have been shy in venturing where the railway accommodation is so primitive.

Monumental News

The Oregon volunteers have about $1,200 on hand for a soldiers' monument at Portland.

The people of Southampton County, Va., propose to erect a Confederate monument at Courtland, the county seat. The monument will be a shaft of Petersburg gray granite, surmounted by the figure of a Confederate infantryman.

A petition is being circulated in Louisiana asking Congress to appropriate money to finish and maintain the Chalmette monument, which marks the site of Jackson's victory over the British at the close of the War of 1812.

The citizens of Cleveland propose to erect a monument to the late Dr. L. B. Tuckerman, of that city, in Lake View cemetery.

Wilmington, Del., has more than $2,000 in hand for a McKinley memorial. It is proposed to have this take the form of a shaft of Brandywine granite surmounted by a stone statue of President McKinley of heroic size. There has been talk of a memorial arch, but it is believed that the cost of this would be too great.

The Iowa House of Representatives has passed the bill appropriating $150,000 for the erection of a monument to the soldiers of the State on the Vicksburg battlefield.

One of the most commendable of the memorial bills before Congress is the one providing for the erection of a suitable monument to Robert Morris at Batavia, Genesee County, N. Y. During the Revolutionary war the services of no one were more valuable than those of Robert Morris to the struggling colonies. While there have been numberless monuments to the commanders in the field, scarcely anything has been done to commemorate the self-sacrificing efforts of the great statesman and financier, who did so much to provide the sinews of war.

A number of contributions have already been offered for a monument to the late John P. Altgeld at Chicago. A statue in Lincoln Park is suggested.

The Women's Relief Corps, of Cedar Falls, Ia., has started a fund for a soldiers' monument in Greenwood cemetery, at that place.

The citizens of the Town of Northbridge, R. I., propose to erect a soldiers' monument at Whitinsville to cost from $10,000 to $12,000.

Contributions are pouring in rapidly for a monument to the late Father Malone of Brooklyn. It is thought that more than the $15,000 wanted will be in hand in a short time.

The New Jersey Legislature has passed bills appropriating $15,000 for a Princeton battle monument and $6,000 for a monument at Antietam.

The jury of award in the competition for designs for a soldiers' monument to be erected in Logan Square, Philadelphia, at a cost of $500,000, has awarded the first prize to Messrs. Lord & Hewlett of 16 E. 23d street, New York. The accepted design bears a strikingly close resemblance to the Washington monument, except that it has a wide and ornamental base. A spiral staircase and an elevator running to the top are provided.

An effort is being made to have Congress appropriate $50,000 for a monument to commemorate the great disaster near Memphis during the Civil war, in which nearly 2,000 Union soldiers lost their lives through the sinking of the steamboat Sultana.

The women of Tappahannock, Va., will try to erect a Confederate monument.

A bill is before the Massachusetts Legislature appropriating $25,000 for a Pilgrim monument at Provincetown, providing that the Memorial Association raises a similar sum.

Post Lyon, G. A. R., will erect a monument at the head of Oneida street, Cohoes, New York.

The monument to the late United States Senator Stephen H. White, of California, will be erected on the Capitol grounds at Sacramento.

The first statue to the memory of President McKinley will be unveiled at Muskegon, Mich., on Memorial Day. It is of heroic size and is now being cast in bronze. It will be mounted on a specially designed granite pedestal. It represents the President in the attitude in which he stood when he delivered his last speech on the day preceding his assassination. The statue is the

work of Charles Henry Neihaus and is a gift to Muskegon by Charles H. Ackley.

Chevalier Trentanove will execute a bust of the late Senator Cushman K. Davis. This will be executed in bronze, will be mounted on a pedestal of red Italian marble, and will be erected in Arlington cemetery.

The G. A. R. Post of Eugene, Oregon, propose to erect a monument to the memory of the veterans of the Civil war, to cost not less than $15,000.

Fond du Lac county, Wis., has voted in favor of a $5,000 soldiers' monument.

E. M. Wolff & Company, of Mansfield, Ohio, will erect a monument over John Sherman's grave in the cemetery at that place. It will be a sarcophagus of Westerly granite, 18 x 8 feet at the base, and will weigh thirty tons.

A $5,000 soldiers' monument will be erected at Bristol, R. I.

The American Lime and Fluxing Co., of which W. H. Terry is president and J. W. Busard secretary and treasurer, is a new company organized under the laws of Wyoming, with a capital stock of $25,000. The properties of the company include claims in Chaffee county, near Newett, Col. Three quarries of limestone have been opened up on the property, and the company expects to do an extensive business in supplying the sugar factories and smelters with lime rock and also in the sale of burned lime.

Daniel Parson, A. C. Courter and Harold R. Sanson, of Newark, N. J., have purchased from Caldwell Brandshaw and T. M. Brandley the controlling interest in the Southern Cement Company, whose plant is located at North Birmingham, Ala. The plant has a capacity of eight hundred barrels a day. The cement is manufactured out of the blast furnace slag. The plant cost originally $70,000.

John W. Tabler, of Frederick, Md., has purchased the Frederick City Lime Company's plant and formed a new organization known as the John W. Tabler Lime and Stone Company.

It is said that an immense cement works will be erected at Epes, Ala., by northern capital.

The Slate Trade

The Cleveland Slate Co., the new lessees of the West Albion quarry at Pen Argyl, will at once remove from 8,000 to 10,000 yards of top.

Sylvester Schleicher and James P. Kern have leased the Locke slate vein at Slatedale, Pa., and will open a new quarry.

William Lobb's Sons will open the quarry at Rockville, in the Pen Argyl section, having given a contract for the removal of about 5,000 yards of top. The quarry has been idle for some time. The well equipped blackboard factory connected with it will be put in operation at once.

Negotiations are in progress for a combination of the leading slate quarries in New England. The deal is being promoted by New York and Boston men who have large interests in the industry. The objects of the union are to maintain a uniform price of the product in the markets and to fix a standard wage scale for workmen employed in the plants joining the combine. The market of the product, it is stated, will be advanced upon the completion of the consolidation. Several of the largest quarry owners now have agreed to the terms of the promoters and it is expected that the rest will follow their action.

Work has been begun on the erection of a new factory at Parsons Bros.' quarry at Pen Argyl, which, when completed and equipped with machinery, will be used by the Pen Argyl Blackboard Co.

There was a short shut down at the Excelsior quarry, at Pen Argyl, owing to the necessity of repairing the boilers.

Robert A. Stotz has been appointed assignee to settle the accounts of the Park Slate Co., which suspended operations at the quarry of the Wind Gap Mfg. Co., now the Penn-Bangor, at Wind Gap, about a year ago.

The slate men declare that a remarkable feature of the business at present is the large demand that has arisen thus early in the season for roofing slate. Many dealers are seeking to make contracts with the quarries to take their entire output for a year. Large orders have already been booked at most of the slate centers for early spring deliveries.

A. Monroe Stephen, of Allentown, has been awarded the contract for the erection of the new plant for the National School Slate Co., at Slatington. The buildings will be of frame on concrete foundations. The factory will be 80 by 105 feet and there will be a boiler and engine house, lumber house, etc. The company expects to employ 300 men when the plant is finished and to turn out 40,000 school slates a day.

S. Weinberg has purchased the Henry McFadden farm at Wells, Vt., where he expects to develop a slate quarry.

Griffith Bros. are opening a new slate quarry near Slatington.

Horatio Miller and Wilson Greer, of Bangor, Pa., have leased a slate quarry at Slateford, with the option of purchasing, if results prove satisfactory.

It is said that capitalists are getting options on farms near Aluta, Northampton County, Pa., with the view of opening up extensive slate quarries.

Labor conditions are not satisfactory in the Pennsylvania region. All of the men, including the slaters, holemen and rubbish hands, demand an increase in price for their work or a 9-hour day, as the case may be. The operators claim that all of their contracts are based upon present prices and that to yield to these demands would mean that they would be compelled to carry out existing contracts at a loss. The men quit work at many of the quarries, but at this writing a temporary adjustment had been made in some cases.

A number of slate merchants in North Wales are busily stocking slates, as it is feared that a slate famine is imminent. There are already indications that trouble is looming ahead irrespective of the deadlock at Lord Penrhyn's quarries. The men are busily enrolling themselves in the Quarrymen's Union and since the beginning of the year the membership of that union has rapidly been increasing. At Festiniog, where close upon 6,000 quarrymen are employed in the different mines, matters are decidedly disquieting. Trades union feeling is strong and the workmen maintain that as the price of slates has increased and that the market generally has improved they ought to have a share in the benefit. No actual application has been made for an increase of wages in a formal manner, but this may be expected at an early date.

Cement in Paraguay.

United States Consul John N. Ruffin writes from Asuncion, Paraguay: There is a large consumption of Portland cement here, as most of the houses are built of brick. One house alone sells about 48,000 barrels per year. Frame houses are not liked in this country, because they afford hiding places for all manner of insects. People here build their walls exceedingly thick, on the principle that both heat and cold are thus excluded; they also cover the houses on the outside with cement.

The chief brands coming to this market are: Aguila, which comes in barrels of 120 kilograms (264 pounds) and costs $1.50 and $1.60 laid down in Buenos Ayres; Cardinal, which comes in barrels of 100 kilograms (220 pounds) and costs $1.70 gold; Leon, which comes in barrels of 100 kilograms, at $1.65; Pato, in barrels of 100 kilograms, at $1.50 to $1.60. This last class is quite inferior, and does not seem to be popular in this market.

It is a great deal better to send heavy material like this to Buenos Ayres, sending shipping documents to a transshipping company and advising it by previous letter (in Spanish) of the steamer on which the shipment is made, so that the lighters may be ready. These lighters remain in the port of Buenos Ayres perhaps six or eight days, awaiting a steamer from Asuncion. The freight on such a cargo boat is $2 less than if the goods are shipped on one of the passenger boats.

I understand that some of the New York lines have arrangements with the Mihanovich Steamboat Company to transship their cargo on a river steamboat, which is as cheap as obtaining a through bill of lading from New York.

The usual term of credit here is six months.

American and Native Slate in Australia.

A correspondent of "The Slate Trade Gazette," of Hull, Eng., writing from Annandale, New South Wales, says: I was surprised to discover, only last week, that I was in a business establishment roofed with New South Wales roofing slates from the Gundagai quarries. Gundagai is a town about 290 miles from Sydney, on a branch line from the south main line. At present the quarries are idle—indeed they have been so for some years—but it is admitted by those who have made investigations that there is plenty of excellent metal waiting development. The quarry was worked—but only in a half-hearted sort of way—some ten or twelve years ago by one or two builders and slate merchants, but after opening it out they spent more than they anticipated, and abandoned it. There is a slate formation in South Australia, and a considerable proportion of the imported slabs coming into this State comes from there. It is a growing trade, and the quality is far superior to the Continental slate, and is very similar to the best Welsh. It is known as Mintaro slate. As far as I can hear, no roofing slates have been quarried in any other of the States excepting New South Wales, and very few here; but I will make further inquiries on the point. The two main reasons for American slates being used so largely here are—firstly, they are considerably lower in price than Welsh, which is a great recommendation to the speculative builder and to others; and secondly, greater facilities are offered to the trader. Firms who handle American products exclusively are here, and indent at a price landed in Sydney, or they will import, and charge a small commission on actual invoice cost. These firms sell from samples such widely different goods as slates and boots.

Greek Columns.

So far from employing pedestals to columns, which some have considered as forming as essential a part of an order as the entablature, the Greeks placed their columns immediately on the floor or uppermost step, the whole temple being generally raised on a low platform, to which the ascent was usually by three deep steps or gradini, serving as a base to the edifice; the depth of the steps was not accommodated to the human stature, but regulated so as to accord with the dimensions of the column. It is therefore conjectured that either a sloping platform of wood or lesser steps of the same material were employed as the real ascent to the temple. The Greeks invariably placed their columns singly, never in pairs, as has frequently been done by modern architects, and which, if not utterly indefensible, ought never to be resorted to unless required by positive necessity; for instance, where wider intercolumns than the scale of the order will properly admit are required, in which case, by affording additional support to the entablature, coupled columns not only excuse the width of the intervals, but take away the air of poverty that would result from single columns placed at the same distance from each other.

Coupled columns are most of all offensive when forming a prostyle colonnade, especially if it be one with a pediment, since that disposition approximates so closely to that of the front of an ancient temple as to render any incongruity the more striking.

Merger in Mineral Wool.

It is proposed to consolidate the firms that manufacture insulating material from limestone and blast furnace slag. The plan is to close several of the plants and do the major part of the work in the Cellular Insulating Co.'s plant at Yorktown, Ind. At the meeting at which the preliminaries were arranged there were represented two concerns each from Iowa, Wisconsin and Minnesota, in all seven. It has been demonstrated in the Yorktown plant that it is much better and cheaper to make mineral wool from limestone than from slag, and at Yorktown the bed of White River is prolific of limestone, from which a fine quality of mineral wool is made.

Limes and Cements

A number of Vancouver men are considering the establishment of a large cement plant near Whatcom, Wash. A deposit of limestone is owned at Sumas, which is believed to be specially suited for cement making.

At the annual meeting the Rockland-Rockport Lime Company re-elected all the old officers, including President Fred. E. Richards, of Portland, and Treasurer Joseph Remick, of Boston.

The Buffalo Cement Company has amended its charter so that it is authorized to deal in real estate.

C. G. Root, an official of the United States Gypsum Company, says that there has been no change in the price of gypsum since that combine was formed. The object is more especially to combine the plaster interests against the encroachments of their natural competitor, lime, and to endeavor, so far as possible, to eliminate the causes that have compelled the manufacturers of gypsum products to do business at an absolute loss for two or three years.

The Sandusky, O., Portland Cement Company has increased its capital stock from $100,000 to $400,000.

The plant of the Marquette Cement Company, near Oglesby, Ill., has been destroyed by fire with a loss of $35,000.

Messrs. John Tripp and Omar Wright, who are operating quarries at Belvidere, Ill., are considering the establishment of lime kilns.

It is said that a cement plant costing $250,000 will be established at Livingston, Ala.

An effort is being made to get the Forsyth Cement Company to locate its contemplated plant in Detroit.

The American Concrete Company has been incorporated under the laws of New Jersey to manufacture Portland cement, concrete bricks, blocks, hollow blocks and any and all kinds of building material that may be manufactured from cement. The incorporators are Cornelius J. Curtain, Newark; Bartholomew Jacot, New York, and Nathan J. Donaldson, Philadelphia. The company commences business with $1,000 capital, with offices in 15 Exchange Place, Jersey City.

A number of Detroit capitalists, Arthur Pack, Tax Receiver Lucking, Homer Warren, Dr. Duff Stewart, William McGregor, Charles Wright, William E. Higginbotham and Ald. Al Deimel, of Detroit, and Justus S Stearns, of Grand Rapids, have purchased 480 acres of land in Livingston county, Mich., along the line of Ann Arbor Railroad, and expect to erect a cement plant. The land contains a large deposit of marl that can be used without dredging.

Options have been secured on land at Smith's Landing, near Catskill, N. Y., and there is talk of establishing a third cement plant there.

Messrs. C. A. Campbell and De Waele Brothers have secured 2,500 acres of marl land in Roscommon and Crawford counties, Mich., and expect to establish a large cement plant.

The Cheshire Lime and Cement Company has purchased the business of Farnum Bros. Lime Company in Cheshire, Mass.

The Colorado Lime Company, of St. Louis, has been incorporated, with $10,000 capital, by George S. Meenach, Albert Weir, Isaiah Pillman and A. L. Pollard.

Newton B. Hall and Benjamin Gwatkin, of Battle Creek, Mich., have purchased marl lands on Sugar Loaf Lake, and contemplate the establishment of a large cement plant.

The cement industry at Akron, N. Y., was established as long ago as 1838 by Jonathan Delano. There are now three mills in operation at this village with a yearly capacity of no less than 1,252,000 barrels, and a combined storage capacity of 375,000. The plant of H. L. & W. C. Newman, the oldest one in Akron, has a daily capacity of 1,000 barrels. The firm owns 290 acres of quarry land, and in addition to its cement business it operates a flour mill with a capacity of 300 barrels a day. The Akron Cement Works, owned by D. N. Lockwood, of Buffalo, has a capacity of 1,000 barrels per day of ten hours. The company controls 271 acres of quarry land. The Cummings Akron Cement Works, the last to be established, has 337 acres of quarry land, and has a daily capacity of 1,200 barrels of natural rock cement and 800 barrels of Portland cement.

The Maiden Lime Rock Company, of Butte, Mont., has been incorporated with $5,000 by William Bennett, James R. Thompson and Arthur Smith.

The Southern Lime and Supply Com-

pany, a corporation composed of the leading lime manufacturers of the South, has decided to advance the price of lime twenty-five per cent.

The Wishel Lime Company, a new corporation of Woodville, O., has organized by the election of the following directors. M. L. Case, A. W. Rudulph, and J. W. Urschel, of Bowling Green, O.; B. H. Urschel, of Sugar Ridge, and F. W. Merry and A. W. Herron, of Pittsburg, Pa. J. W. Urschel was elected president and general manager, and B. H. Urschel secretary and treasurer.

The Catskill Cement Company has increased the capacity of its plant at Smith's Landing, N. Y., from 400 barrels to 1,000 barrels.

The Phœnix Cement Company is averaging more than 1,000 barrels a day production at its plant at Nazareth, Pa. One day recently the company manufactured 1,310 barrels of cement.

The new cement works at Cayuga Lake, N. Y., has begun operations with an initial production of about 1,000 barrels a day. The main office of the company is at Ithaca, with M. E. Calkins manager.

The cement works of T. Millen & Co., at Wayland, N. Y., which have been shut down for three months, have resumed operations.

The Chewacla Lime Works will sell its extensive property at Opelika, Ala., consisting of about 8,000 acres of fine farming land. The rock runs so deep in the quarries that it can no longer be run at a profit. The company operates another plant at Calcis, Shelby county.

David Haskins, Jr., O. C. Gregory, and H. C. Trask have bought the Failthorp & Teets property near Petoskey, consisting of 123 acres, and will manufacture lime.

The Acme Cement Plaster Company, of Chicago, has purchased the Laramie Cement and Plaster Works, at Laramie, Wyo.

The Elliston Lime Company has been incorporated at Elliston, Mont., by W. A. Walker, of St. Paul, Minn., and W. T. Kuehn, H. F. Kuehn and J. M. Kuehn, of Powell county, Mont.

The Crescent City Cement and Stone Company has been incorporated at Denver, Col., with $100,000 capital stock, by W. F., S. T. and M. S. Kendrick, to operate in Jefferson county.

A large new storehouse of the Helderberg Cement Co. at Howes Cave, N. Y., containing about 25,000 barrels of loose cement, gave way under the immense pressure recently, and precipitated the cement on the Delaware & Hudson tracks.

It is said that the cement plant at Quincy, Mich., which has been closed for over a year, will be opened at once.

The Lime Business in Maine.

William T. Cobb, of the Rockland-Rockport Lime Co., one of the biggest concerns of its kind in the world, thinks that the outlook for the lime business the present season is unusually good.

"Steel construction has eliminated lime to a large extent," Mr. Cobb says. "Nowadays they can't even wait for plastering to dry. The owner wants to be getting rent at the earliest possible moment and he can't wait for old-fashioned plaster. The rent of a big office building is too large a matter to be set aside for a moment longer than is necessary. I realized this sharply not long ago in New York when I passed a big office building which was in a more or less congested condition. It was a steel structure ten or eleven stories high. It was to be a granite front, the two lower stories of polished stone, the rest in the rough. The rough stone had come, but the polished blocks for the lower stories had failed to arrive. What had they done? Waited? Well, not much! They took the rough stone, began at the third story and carried it up to the roof, leaving only the steel skeleton on the lower floors. It would have surprised people a few years ago to have seen solid granite masonry beginning at the third story and running up half a dozen stories with as much confidence as though it was resting on bed-rock.

"This development of steel structure has, of course, diminished the demand for lime, but at the same time there has been an offset in increased construction in other lines which has kept business good for the 'Maine limeburner.'

"This season," continued Mr. Cobb, "we shall make a new move in the shipment of lime. Up to the present we have always shipped our lime in casks, but this season we are going to try the experiment of freighting it in bulk. Our use of steel barges makes this possible. In the old way, with wooden bottoms, there would have been trouble right away had this been tried, but in the steel barges, with their rubber gaskets, the holds are air-tight and water-tight. We see no reason why it will not work successfully, though we can hardly tell till we have made arrangements for the discharge and storage of the lime in New York and given the plan a trial. If it works as we think it should there would be a large saving in expense for barrels and time in filling them."

Contracts and Building

Government Work.

Cumberland, Md.—The contract for the new post office and court house here has been awarded to Arthur Cowsill of Washington at $97,000. It is hoped that an additional appropriation of $50,000 can be secured so that the building can be constructed of stone instead of brick.

Des Moines, Ia.—An appropriation of about $500,000 is available for the erection of the new army post here.

Galveston, Texas.—The bids of the Texas Portland Cement & Lime Company, of this city, have been accepted for the cement to be used at Forts Crockett and San Jacinto.

New Orleans, La.—The sum of $46,000 has been appropriated for the new building for the naval station.

Salt Lake, Utah.—Bids will be received until May 5, at the office of the supervising architect, Washington, for the construction of the United States court house and post office here. Plans and specifications may be seen at the office of the postmaster here or at the office of the supervising architect, Washington.

Washington, D. C.—The Navy Department is completing plans for the construction of two of the largest stone dry docks in the country, one to be at the New York and the other at the Norfolk Navy Yard. They will cost about $1,100,000 each, and will be capable of taking in the largest ships now afloat or in process of construction. They will be similar in design to the big stone docks now being constructed at Boston, Mass., and Portsmouth, N. H.

State, County and City Buildings, Hospitals, etc.

Burlington, Ia.—A county asylum building will be erected after plans by George H. Washburn.

Grafton, N. D.—A new building will be erected for the Feeble Minded Institution. It will be of light brick with stone trimmings and will cost $30,000. Plans by Hancock Bros., Fargo.

Little Rock, Ark.—The plans of Architect F. W. J. Hart have been accepted for the Arkansas State building at the St. Louis World's Fair. It will be a free adaptation of the Renaissance style and will be constructed almost wholly of Arkansas material, including granite, marble and slate.

Livingston, Mont.—The city will erect 375 feet of stone dyke on the Yellowstone River.

Lumberton, N. C.—Robeson County will erect a $25,000 jail.

Mobile, Ala.—The contract for the superstructure of the new Providence Infirmary, to be erected by the Sisters of Charity, has been awarded to the Fonde Building Company, of this city, at $100,000.

Montgomery, Ala.—A contract for the new hospital to be erected by the Roman Catholic Sisters of Charity has been awarded to Graves & Anderson, of this city, at $120,000.

St. Cloud, Minn.—An administration building of gray granite will be built at the State Reformatory. Most of the work will be done by inmates.

St. Louis, Mo.—The Missouri State building at the St. Louis World's Fair will be a permanent structure of two stories and basement designed by Director of Work Isaac S. Taylor. The foundation will be of Missouri granite, the upper portions of cut stone, while the interior will be finished in onyx and marble produced in the State. The style of architecture will be of the French Renaissance, and almost all of the material entering into its construction will be native to the State.

St. Paul, Minn.—Bids will be received until October 7, 1902, for the interior stone and marble work on the State Capitol. Bids on this work must be accompanied by a certified check for $2,500.

St. Paul, Minn.—The city will erect a $100,000 armory after plans by Hermann Kretz & Co.

Williamsburg, Va.—The Town building at the Eastern State Hospital, which was recently burned, will be rebuilt at a cost of $65,000. Plans by Noland & Baskerville.

Churches, Convents and Synagogues.

Augusta, Ga.—The First Baptist Congregation already has $24,000 in hand toward

the erection of a new church. Rev. L. M. Roper.

Baltimore, Md.—St. Paul's Catholic Society will build a new church at Caroline and Oliver streets. Connected with it will be a home for the St. Francis Sisters, of stone. Thomas C. Kennedy has prepared plans for the two buildings, which will cost about $75,000. The Fulton Avenue Presbyterian Church will erect a new stone edifice at a cost of $20,000. E. W. Hale, chairman.

Bristol, Tenn.—The State Street Methodist Society will erect a new $20,000 church.

Chestnut Hill, Pa.—St. Paul's Episcopal Church will build a baptistry of stone with stone and marble interior. Plans by J. C. M. Shirk.

Eufaula, Ala.—The Methodist Episcopal Society has the sum of $53,000 in hand for a new church.

Fairmont, W. Va.—St. Peter's Catholic congregation will erect a new stone church, after plans by Architect Badgley, to cost about $70,000. Father Boutlou, rector.

Manayunk, Pa.—The Roman Catholic Church of St. John the Baptist will erect a canopy shrine of Vermont marble.

Norfolk, Va.—St. Luke's Episcopal congregation has had plans prepared for a $20,000 parish school.

Orlando, Fla.—It is expected that St. Luke's Cathedral, to be erected here, will cost fully $100,000.

Richmond, Va.—The Sir Moses Montefiore congregation will erect a new synagogue.

Spartanburg, S. C.—The First Baptist congregation will erect a $24,000 church.

Washington, D. C.—The design for the McKinley Memorial Church, which it is proposed to erect in this city at a cost of $100,000, has been designed by Glenn Brown. The plans call for a structure strikingly impressive and simple and immediately suggesting the idea of a memorial. The building is classical in style, in the form of a cross, with a large central dome surmounted by a lantern and four smaller domes of the same character at the corners. The entrance is through a portico with six massive columns, and there are also columns at the side. The galleries are supported by cantilevers resting on girders which run from the clustered columns that form the intersection of the cross. By this means an unobstructed view is given of the whole interior of the church. The auditorium is lighted from the dome and from windows on three sides. Rev. George Buckler is the leading spirit in this projected memorial.

Wheeling, W. Va.—Two new churches are to be built here, one for St. Stephen's German Reformed congregation and the other for St. Stanislaus' Polish congregation. Both will be of brick and stone, will be on Jacob street, and are after designs by Giesey & Faris.

Business Buildings, Theatres, Hotels, Society Halls, Etc.

Baltimore, Md.—The Howard National Bank will erect a fireproof bank building at Howard and Fayette streets. Joseph E. Sperry is preparing plans. It is proposed to erect an apartment house for young men at a cost of about $400,000. Ellicott & Emmert have submitted plans. An apartment house seven stories high and costing about $200,000 will be erected on the site of the Old First Congregational Church, North Eutaw street. Glidden & Myers, architects.

Bay City, Mich.—Two large manufacturing buildings will be erected for the Bay City Knitting Works and the National Milling & Evaporating Co.

Birmingham, Ala.—The Birmingham Title, Guarantee & Trust Co. are to build a 9-story building costing about $150,000. The exterior will be of pressed brick and terra cotta, but there will be marble stairs within.

Bristol, Va.—The Burson Investment Co. will erect an $50,000 building here.

Buffalo, N. Y.—The Lackawanna Iron & Steel Co. will erect 454 houses for its employees adjoining its new plant at Stony plant.

Canton, O.—The Novelty Iron Works, recently burned with a loss of $100,000, will be rebuilt at once.

Charitan, Ia.—The National Bank here will put in a new marble front, after plans by Proudfoot & Bird, Des Moines.

Charlotte, S. C.—An immense enterprise is now fully underway at the Narrows of the Yodkin River, in Stanly County. This is the erection of a great power plant and a dam. More than 8,000 carloads of stone will be required. The power house will be of brick and stone and will cost about $200,000; will be 300 ft. long and 100 ft. wide. It will contain machinery costing more than $500,000. The company was organized by special charter from the legislature of North Carolina and is capitalized at $10,000,000. The main offices of the company are in Salisbury, N. C.

Chicago, Ill.—The W. Dallen Mfg. Co. will erect a factory for the manufacture of belting and rubber goods.

Clarksburg, W. Va.—George Nathan Goff will build a brick and stone business house


A. LESCHEN & SONS ROPE CO.
920 - 922 N. 1ST ST., ST. LOUIS, MO.
BRANCH OFFICES:
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137 EAST LAKE ST., CHICAGO, ILL.
85 FREMONT ST., SAN FRANCISCO, CAL.
AERIAL WIRE ROPE
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ELEVATORS · ETC.
THE ABOVE SHOWS 2100 FT. SPAN ON
AMERICAN NETTIE TRAM, OURAY COLO.
BUILT BY LESCHEN CO.

three stories high, costing $30,000. The Goff M. E. Chapel is contemplating rebuilding at a cost of $65,000.

Davenport, Ia.—A new hotel to cost $150,000 will be erected here for Gorman & Harrison.

Decatur, Ala.—The Knights of Pythias have accepted plans for a three-story stone and brick temple.

East Downingtown, Pa.—The Downingtown Opera Co. will erect a new opera house of stone, brick and terra cotta. Plans by Frank Keisker, 14 S. Broad street, Philadelphia.

East Pittsburgh, Pa.—The Westinghouse Electric & Mfg. Co. will build a $200,000 retaining wall here and will probably erect a large plant on the ground just secured.

Lodge Pole, Neb.—A hotel building of stone is projected for this place.

Louisville, Ky.—An 8-story flat building of brick and stone, costing $300,000, will be erected by Weissinger & Gailber, at Broadway and Third street, after plans by Kenneth McDonald.

Marietta, O.—The Marietta Shoe Co. will build a large addition to its factory.

New York, N. Y.—George W. Vanderbilt will have an elaborate new facade for his residence at 640 Fifth avenue. Plans are being prepared by Richard H. Hunt.

Paducah, Ky.—A project is on foot for the erection of a five-story hotel, costing $150,000, at Fifth street and Broadway.

Portsmouth, O.—The newly incorporated Portsmouth Pressed Steel Co. will erect a plant here.

Richmond, Va.—Plans have been completed by Hodges & Leach for the new Hotel Colonial, to be erected by Mrs. A. D. Atkinson at North and Grace streets. The building will be erected at a cost of $350,000. Nine of the largest building firms in the country have been asked to bid.

St. Louis, Mo.—Broderick & Wade are drawing plans for a hotel containing 3,884 rooms, to be erected at the Exposition grounds.

Spokane, Wash.—A $40,000 Masonic Temple will be erected after plans by Dow & Rand.

Tampa, Fla.—W. H. Kendrick will erect an office building at Franklin and Lafayette streets, of pressed brick with marble trimmings, costing about $40,000.

Toledo, O.—The Union Lead & Oil Co. will erect a large lead corroding works here.

Winston, N. C.—The Elks will build a $40,000 opera house and home after plans by O. M. Gates, of Greensboro.

Bridges, Depots and Railroad Works.

Augusta, Ga.—T. O. Brown has secured the contract for the new Union Depot here at $140,000.

Bristol, Va.—The Norfolk & Southern will erect a $100,000 passenger station here.

Buffalo, N. Y.—The Pennsylvania Railroad will probably build freight terminals in South Buffalo adjoining the plant of the Lackawanna Steel Co.

East Haven, Conn.—The Town Board has voted to permit the Tide Water Trap Rock Company to build a bridge in place of the present dike at Stony River.

Elgin, Ill.—The Chicago & Northwestern is expected to build a $50,000 passenger depot here.

Fremont, Neb.—The Fremont, Elkhorn & Missouri Railroad will build a $40,000 station here.

Hartford, Conn.—The Common Council has adopted resolutions appropriating $1,000,000 for a stone bridge over the Connecticut River and $700,000 for the Hartford approach. Both propositions will be voted upon at the next election.

Harrisburg, Pa.—The work of remodeling the Pennsylvania Railroad here will begin at once.

Horton, Kan.—The Chicago, Rock Island & Pacific car shops here, which were burned in February, are being rebuilt. A new boiler shop, 90 x 100 feet, will be added.

Indianapolis, Ind.—An ordinance is before the Common Council for the construction of an 80-ft. stone bridge across the White River at Washington street, at a cost of $150,000. One or two members of the council favor striking out the requirements for a stone bridge so that a Melan arch bridge may be considered. The majority, however, favor a stone structure.

Kenova, W. Va.—The Norfolk & Western will expend $500,000 in adding a new track and building new bridges between this place and Columbus.

Newark, N. J.—The North Jersey Street Railway will build a $400,000 power house here. The Delaware, Lackawanna & Western has begun work abolishing grade crossings between Harrison and Roseville avenues.

Norwich, N. J.—The Delaware, Lackawanna & Western will build a new passenger station here, 146 x 40 feet in size.

Paterson, N. J.—The authorities are in favor of a concrete structure to replace the

Arch street bridge. The distance between abutments is 170 ft. 6 in.

Racine, Wis.—The Chicago, Milwaukee & St. Paul will build a new freight house here, 160 x 35 feet in size.

St. Paul, Minn.—The Great Northern Railroad will build five large shops on Dale street here. They will be of steel and concrete, each one story high, and will cost, exclusive of the machinery, $250,000.

Scranton, Pa.—It is reported that the Delaware, Lackawanna & Western will enlarge its shop in this vicinity.

Sioux City, Ia.—The contract for the erection of the new passenger station for the Chicago & Northwestern Railroad here has been awarded to C. W. Gindele Co., of Chicago, at $120,000.

Springfield, O.—The Big Four Railway will erect a $75,000 passenger station and make other improvements here at a total cost of $500,000.

South Bend, Ind.—The county will build a concrete arch on Pennsylvania avenue and a steel bridge with concrete abutments and also an iron bridge with stone abutments, the latter three miles from Mishawaka. John M. Brown, auditor.

Schools, Colleges and Libraries.

Alton, Ill.—A high school, to cost $43,000, will be erected here.

Beatrice, Neb.—A $20,000 Carnegie library will be erected here.

Binghamton, N. Y.—The city is to have a $20,000 Carnegie library.

Birmingham, Ala.—Work will soon begin on the $50,000 Carnegie library. The Y. M. C. A. has raised $22,000 for its new building, and plans have been completed for it.

Birmingham, Ala.—A project is on foot here for the erection of a Technological High School.

Boston, Mass.—Mrs. Collis P. Huntington has given the sum of $250,000 to Harvard University for the erection of a building in memory of her late husband.

Dothan, Ga.—The plans of Ausfield & Chapman have been accepted for the $20,000 school, which is to be in Renaissance style, and of stone, brick and terra cotta.

Dowagiac, Mich.—The town will issue bonds for the erection of a high school, costing $25,000.

Ellendale, N. D.—The State Manual Training School will erect a $35,000 building here.

Jewell, Ia.—A new dormitory will be erected for the Swedish Lutheran College here, after plans by C. C. Cross & Sons, Des Moines.

Meridian, Miss.—The plans of Krause & Hutchinson have been selected for the new $30,000 school building.

Monmouth, Ill.—A new school, to cost $25,000, will be erected here.

Niagara Falls, N. Y.—A Carnegie library, costing $50,000, is to be erected here.

Oshkosh, Wis.—The Lutheran Church, on Eighth street, will erect a parochial school, after plans by William C. Klapproth.

Peoria, Ill.—The new school building to be erected here will cost $45,000.

Racine, Wis.—A $50,000 library building will be erected here.

Raleigh, N. C.—The Agricultural and Mechanical College will erect a two-story memorial hall of brick and granite.

St. Peter, Minn.—Gustavus Adolphus College will build a $30,000 auditorium.

Springfield, Ill.—A new school house is to be erected in First ward.

Stevens Point, Wis.—St. Joseph's Academy will erect a new three-story building of pressed brick and cut stone at a cost of $40,000. Charles R. Aldrich, architect.

Xenia, O.—The Legislature has passed a bill that will permit the city to erect a $20,000 Carnegie library under the usual conditions.

The Edison Cement Plant.

Thomas A. Edison recently paid a visit of inspection to the Edison cement plant, near Stewartville, N. J. Mr. Edison hopes to have the plant in operation by the first of June. The entire plant will be run by electricity, 125 dynamos having been installed for furnishing the current. The large reservoir is now being filled with water pumped from a nearby creek.

When the plant is in operation Mr. Edison's devices will enable the company, it is said, to turn out more cement than any mill of its size. Employment will be furnished to six hundred men.

Enjoining a Stone Quarry.

Mr. James McCuin is operating the stone quarry of the Consolidated Stone Company of Washington, D. C., situated just across the river from Occoquan, Va. Some of the residents of Occoquan have secured an injunction from the Circuit Court restraining Mr. McCuin from blasting in the quarries, claiming that stones have been thrown into the village by the powerful explosions in the quarry. They claim that roofs and windows have been broken. Stone from the quarry is largely used in the street improvement in Washington.

Trade Notes

The American Air Compressor Works has been formed to manufacture air compressors for all purposes, and furnish compressed air tools and appliances. The offices of the company are in the Havemeyer building, New York, and the works are at Van Brunt and Summit streets, Brooklyn. Mr. William S. Fairhurst is manager of the new company, and Mr. John J. Riley treasurer. Mr. Frederick B. Vail will have charge of the sales department in the New York office.

The ability of the American engineer to design steel structures of great strength and pleasing architectural effect is shown in the eight half-tones on the handsome souvenir mailing card issued by the Joseph Dixon Crucible Company, of Jersey City, N. J. The card is a piece of artistic advertising on the part of the company, and will prove of decided interest to constructing engineers and architects, to whom it will be sent on request. Dixon's Silica-Graphite Paint, which protects these structures from corrosion, has been very extensively used in the south, west and seacoast sections of the United States, also in Mexico, Australia, China, Japan, West Indies and Philippine Islands, and has proven its protective and wearing qualities in all climates.

The McKiernan Drill Co., with office and salesrooms at 120 Liberty street, New York, and works at Dover, N. J., has just secured from the New Jersey Zinc Co., of New York, for their zinc mines at Franklin Junction, N. J., an order for two cross-compound condensing Corliss air compressors, of a capacity of 6,534 cubic feet of free air per minute each. The transaction involves the sum of $50,000. The McKiernan Co. manufactures all styles and sizes of air compressors and rock drills and their machinery is well and favorably known throughout the entire stone trade of the country.

The American Quarry Co. of Stonington have secured the contract to furnish the stone for the State Armory and Arsenal building at Springfield, Ill. The building is to be all stone and will cover a half block. This certainly is a nice contract for the American Quarry Co. It will be quite an advertisement for them. The people of old Lawrenceport certainly have just cause to be proud of their prospect of development in the stone business. We congratulate them on their good fortune and hope it will develop beyond their fondest expectations. —Mitchell Tribune.

There is considerable activity in the stone industry in the neighborhood of Eureka Springs, Ark. There are several companies that are producing a high grade limestone, attractive in color, and somewhat of the nature of the famous Indiana limestone, save that it is finer in grain. Mr. L. A. Fearn, of the Eureka Stone Co., of Eureka Springs, said recently to a reporter:

"The fame of the water of the place, together with the efforts put forth by the Commercial Club to advertise the town, have been the means of bringing many people to the resort. A number of wealthy Chicago and New York capitalists are erecting handsome winter homes there. A new post office, the finest in the West, is in course of construction and every few days some new enterprise is announced.

"Eureka Springs furnishes the finest grade of sandstone that can be found in the country and it is being used largely for building purposes. The stone was first prominently used in the construction of the famous Crescent Hotel at Eureka Springs, which is conceded to be one of the finest structures of the kind in the South. It was built about fifteen years ago and looks as fresh and unimpaired to-day as when it was completed."

The rapid increase in the trade enjoyed by the proprietors of soda fountains in the leading cities of the United States has led to the installation of many very elaborate and costly outfits. Most of the finer ones are made of Mexican onyx and cost in some instances as high as $15,000 or $20,000, says the "American Exporter." A $15,000 soda fountain would be made of the finest material and would be of great size. It might have thirty draft tubes and 100 syrup cans. Very beautiful onyx fountains of the dimensions more commonly used, say with ten syrups and three draft tubes, can be bought for from $850 to $1,200. In fact, a handsome onyx fountain can be bought for $600. But not everybody wants an onyx fountain.

There are yet purchasers who prefer one of marble. A marble fountain with onyx trimmings could be had at, say, $450. An old style marble fountain might be had for $150.

Fifty years ago or thereabouts soda water was drawn from a silver tube rising out of the counter. Then came the first visible soda fountains, small marble boxes, placed on the counter. From these developed the elaborate and often costly fountains of marble that preceded the onyx fountain of the present. Beautiful and costly marble was brought from all parts of the earth to be used in the construction of soda fountains, but now the fashion is onyx, with a canopy or superstructure of wood. Along with its great development in beauty has come a corresponding improvement in the soda fountain's working parts. The modern fountain is far more convenient and efficient in operation than its old-time predecessor.

Marble Under the Chicago City Farm.

A newspaper dispatch from Chicago says that John J. Sloan dreams of dwelling in marble halls—if he remains superintendent of the House of Correction long enough. He told Acting Mayor Walker recently that he had discovered a quarry of marble on the Bridewell grounds rich enough to pay off the city's entire indebtedness, house all the city officials in marble palaces, and still have enough left for monuments to former Oil Inspector Burke, City Sealer Quinn and other heroes of the Harrison administration.

The city owns sixty-five acres of this farm. Two years ago Mr. Sloan conceived the idea of digging up one corner of the farm and making it into brick. At a depth of thirty-two feet he struck a stratum of limestone. Mr. Sloan's experience led him to suspect that a bed of marble lay below the limestone. Borings recently made showed a fine-grained marble of a superior quality and capable of a high polish.

Prices for the Medina Quarries.

The formation of the Medina Quarry Co., which is a combination of the leading quarries in the Medina sandstone district, has already been announced. The new company takes in 32 quarries. The new company executed a mortgage in favor of the North American Trust Co., of New York city, for $1,200,000. Most of the transfers of the quarry properties to the syndicate have been recorded in the County Clerk's office of Orleans County. In most cases it is declared that payment is made partly in cash and partly in stock of the company. The considerations named in each deed is $1, but from the revenue stamps it can be seen that the prices for the leading properties were as follows:

E. F. Fancher, $110,000; DeGraff & Roberts, $110,000; Gilbert Brady, $68,000; Michael Slack, $40,500; M. H. Phillips, $60,000; Mrs. D. L. Goodrich, $20,000; Wm. O'Brien, $56,000; Bernard O'Reilly, $18,500; Margaret McCarthy, $13,000; A. J. McCormick, $35,000; John Hebner, $4,500; Martin Scanlon, $6,500; Samuel Sturaker, $4,500; Charles Holloway, $32,500; Henry Roraback, $7,500; Chadwick Bros., $32,500; Henry Gwynn, $11,500; Alma S. Keys, $12,000; Thomas Garrett, $8,000; Baldwin & Hinds, $10,000.

The Governor Pingree Monument.

Sculptor Rudolph Schwarz, of Indianapolis, has received the contract for the monument to Governor Pingree, which the city of Detroit will erect at the entrance to Grand Central Park. The monument will cost $12,000, and is to be completed by next April. Mr. Schwarz was awarded the contract over eighteen competitors, who exhibited twenty-four models. Among the sculptors who competed were Rhind, Niehaus, Martiny, Potter and Brewster. The bronze statue will be 10½ feet high and will show Governor Pingree seated. It is to be mounted on a pedestal of granite that will rest on an 11 foot base, 22 feet square. Mr. Schwarz came to this country from Berlin to supervise the decorative work on the Indianapolis Soldiers' Monument for Bruno Schmitz.

Getting Out Big Granite Columns.

The Hallowell Granite Works have been unusually busy in shipping the first of the immense granite columns that are to be used in the Hall of Records in New York. There are eight of these columns in all, measuring 36 ft. 10 in. in length and 4 ft. 10 in. in diameter. They are by far the largest lot taken from the Maine quarries for some time. Before leaving the sheds at the quarries they are crated with heavy planking. In order to cart them 38 horses were required, as well as a small army of men. The company has been extremely fortunate in the delicate work of quarrying and moving such monoliths.

Book Reviews.

MONOGRAPH XL. OF THE UNITED STATES GEOLOGICAL SURVEY. Charles D. Walcott, Director. Washington: Government Printing Office.

The latest monograph of the United States Geological Survey bears too long and imposing a title to be used as a caption. It is "Adephagous and Clavicorn Coleoptera from the Tertiary Deposits at Florissant, Colorado, With Description of a Few Other Forms and a Systematic List of the Non-Rhynchophorous Tertiary Coleoptera of North America," by Samuel Hubbard Scudder. This is a complementary volume to Monograph XXI. of the United States Geological Survey, which was issued as a first instalment of the history of our fossil Coleoptera. The volume contains 11 plates of carefully drawn illustrations reproduced by photogravures.

NINTH ANNUAL REPORT OF THE MASSACHUSETTS HIGHWAY COMMISSION. Boston: Wright & Potter Printing Company.

During the year 1901 the Massachusetts Commission had available for the improvement of the highways of the State the sum of $500,000. During the year there was completed a total of sixty-two miles of road, making a grand total of completed State highway at the end of the year 1901 of about 358 miles. Twenty additional miles were laid out and the work is in various stages of progress. While so much has been accomplished under the system of State Aid, it does not represent all of the improved highway construction in Massachusetts. Fully fifty towns in different parts of the Commonwealth have made appropriations and built macadam roads. The roads thus built by the town since 1894 and independent of the State roads measure in the aggregate about 500 miles. The Commissioners report that the object lesson furnished by the State has had its effect on the town and they are in most instances carefully considering drainage, foundation and other details of construction. The Massachusetts Commission consists of three members and the State is divided into three divisions, one of which is assigned to each commissioner. Under this system there have been few delays and in the "small town" work particularly it has been possible to determine the local conditions and make recommendation as to what should be done and the best manner of doing it. One of the greatest difficulties before the Commission has to do with the presence of the tracks of street railways which operate on the State highways. The Commission urges the necessity of placing the approval of locations to street railways in the hands of one central authority. Massachusetts now owns seventeen steam rollers purchased by the Highway Commission and intended primarily for the towns of less than 12,000 population.

REPORT OF THE DEPARTMENT OF MINES, NOVA SCOTIA, FOR THE YEAR 1901. Halifax, N. S.: Commissioner of Public Works and Mines.

In most of the branches of mineral production in Nova Scotia, there was a decided increase over the output for the previous year. The amount of gypsum produced was 135,637 tons, as compared with 122,281 tons for 1900. The output of limestone was 95,794 tons, as against 50,000 for the previous year. The production of grindstones, however, shows a very great falling off, being only 315 tons, as against 56,500 tons for 1900. Within the past eighteen months the Government has purchased five drills of different patterns and all have been continuously employed since their arrival. These include two large sized Calyx drills made by the David Calyx Drill Co., of New York; one steam diamond drill, manufactured by the Sullivan Machinery Co., of Chicago, Ill., and two diamond hand-power drills manufactured by the same company. The inspector reports that although upward of 5,000 feet of boring has been accomplished not a hole was lost or had to be abandoned on account of any inefficiency in the machines. The report gives a list of mineral leases other than gold in the province. These number more than 150, showing the increased interest there is in the mineral resources of the province.

THE ASPHALT AND BITUMINOUS ROCK DEPOSITS OF THE UNITED STATES. By George H. Eldridge. Washington: Government Printing Office.

This extract from Part I of the Twenty-second Annual Report of the United States Geological Survey has been issued as a separate bulletin. The information presented in the report is, in the main, the outcome of the writer's personal investigation of the deposits. It is a general and comparative review of the deposits of asphalt and bituminous rocks in the United States, with no attempt to discuss the many varieties of material from a chemical standpoint nor their merits for paving and other uses. The work has been very thoroughly done and

Mr. Eldridge gives a careful description not only of the quarries that are now in operation but also of those which have been abandoned or are no longer worked for any reason. There are many excellent maps and good illustrations in the report.

Process of Making Imitation Marble From Slate.

The preparation of slate to imitate black marble is done, according to a description published some time ago, by Belgian workmen in the following way: The surfaces of the slate are made smooth with sandstone to obliterate previous chip marks. A polish with "artificial pumice-stone" and then with "extremely light natural pumice-stone" follows. The slate is then dried and heated, and treated with a hot mixture of "oil" and lampblack. This is left for twelve hours, and the dressing repeated if necessary till grayness gives place to blackness. Further polishing follows with emery and linen rags, and then with "tin-ashes" and lampblack. The final polish is given with "wax" dissolved in turpentine, applied, left for some time, and then rubbed off vigorously with clean linen rags.

A Zinc City.

"A City of Zinc" is the name which may appropriately be given to the mushroom city of Portuguese East Africa, Beira, says the "London Tablet." All the houses, all the hotels, and public buildings, barracks, and warehouses, are built of zinc. So great has been the speculation in building and so urgent the need for supplying the inhabitants with cheap and speedily erected dwellings that a city was built up in six months. Thousands of tons of zinc from France, England and America supplied the material. The unpleasant impression produced by the aspect of this zinc town is heightened by the thought that men have to dwell in these houses under a tropical heat. Everything in this strange city is under dominion of the metal. Even when a person falls ill he is carried on a zinc stretcher to a hospital, which is also, of course, made of zinc. And if he dies he is laid to rest in a zinc coffin.

To Mark Virginia Battlefields.

Steps are being taken by prominent citizens of Virginia for the marking of the notable battlefields of the Civil War in that State. Thomas F. Ryan, of New York City, has agreed to pay the cost of the simple monuments that are to be erected. It is not proposed to mark a line of battle, but the most interesting points in that line. It has been suggested that the following places be marked: Salient points in the "Bloody Angle," at Spotsylvania Court House; the bivouac of Lee and Jackson on the night before the battle of Chancellorsville; the Plank road where Lee was led to the rear by the Texans; Lee's headquarters on the Old Mine road; Lee's headquarters at the battle of Fredericksburg; Jackson's headquarters at the battle of Fredericksburg; the point where Jackson died.

A Year's Strikes in Europe.

The following table shows the number of strikes and the number of workpeople affected by them which took place in the six great Continental countries during 1900 and in the United Kingdom for the same period:

Country.	Disputes.	Work-people Affected.
United Kingdom	648	188,538
Germany	1,408	141,127
France	903	222,760
Austria	311	60,187
Italy	268	53,276
Sweden	104	10,290
Denmark	98	36,096

Further analysis shows that the time lost by reason of trade disputes in the last year for which statistics are available amounted to 3,153,000 days in the United Kingdom, 3,761,000 days in France, 287,000 days in Italy, 332,000 days in Sweden, 1,136,000 days in Austria and 2,820,000 days in Denmark.

Classic Dies.

The orders are sometimes set on pedestals consisting of a square shaft, called the die, with a moulded base set on a deep plinth. The die is surmounted with mouldings forming a capital, but in reality resembling more the cornice of an entablature. Chambers allows, for the proportion of the die of the Tuscan pedestal, 2 modules 24 minutes; for the Doric, 3 modules 6 minutes; the Ionic, 3 modules 18 minutes; and the Corinthian and Composite, 4 modules. The bases and capitals are respectively—Tuscan, base 28 minutes, capital 14 minutes; Doric, base 32, and capital 16 minutes; Ionic, base 36, and capital 18 minutes; and Corinthian, base 40, and capital 20 minutes.

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WANTED—To buy second-hand belt hoist, double drum, 5 to 10 tons capacity; also derrick irons and derrick with 50 foot boom. Address "Double Drum," care of STONE Magazine.

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...OF ...

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VOLUME XXIV. **NUMBER 4.**

STONE.

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A VIEW OF "THE GRANITE CITY"—ABERDEEN

STONE

VOL. XXIV. NUMBER 4.

A COMBINATION OF WISCONSIN GRANITE PRODUCERS.

WE have taken many occasions to speak of the efforts that have been put forth to bring about consolidations in various lines of stone production. We have endeavored to show that consolidation was practical only in certain cases, where the field of production for a certain variety of stone was limited in extent. With the fever for combination in the air and with trusts being brought into existence every month in various lines of business enterprise, it is not strange that the efforts of promoters should be turned in the direction of stone production. The consolidations that have been carried through successfully are those of various granite producers at Quincy and at Milford, of the Hudson River Blue Stone producers, and of the quarrymen in the Medina sandstone district. For some time efforts have been put forth to bring about a combination among the granite quarrymen of Wisconsin, and it looks now as if the efforts would be crowned with success. The Western Consolidation Granite Company of Chicago has been formed to absorb six granite companies in Wisconsin, those at Berlin, Utley, Waupaca, Montello, Ableman and Devil's Lake. W. B. Baker, the principal stockholder of the Waupaca Granite Company, is the promoter of the new corporation, and its president, Charles B. Carpenter, of Racine, is vice-president, and Albert N. Eastman and John J. P. O'Dell, of Chicago, are secretary and treasurer. The company will have its headquarters in Chicago and will maintain branch offices in each town where a quarry is located. It has been reported that the corporation secured options on all of the quarries at St. Cloud, Minn., and Sioux City, Ia., and on several of the leading deposits of granite in Georgia. These rumors are denied, however, and it is likely that the new corporation will confine its efforts to the production of Wisconsin granite.

There seem to be many good reasons to justify such a combination as this, without any regard for the present craze for establishing trusts. There are no finer granites produced in this country, or in the world for that matter, than can be taken from the Wisconsin quarries. Much of the stone has a richness of color and a beauty of marking that can scarcely be matched elsewhere. There are deep warm reds and vivid pinks mottled with green, to say nothing of the commoner colors that are found in other localities.

The stone is particularly fitted for the higher grades of monumental and decorative work. Every stone man and architect is familiar with the rich effect shown in General Grant's mausoleum in New York, which is made of the Montello granite. The Wisconsin quarries would long ago have reached a high stage of development had it not been for lack of adequate transportation facilities. It is more necessary in the case of this stone than with most others that the production should be in the hands of a company with abundant capital. The formation of the present corporation will simply mean that production will be stimulated and that the quarries will be handled in an enterprising and up-to-date manner. The corporation can in no sense be called a monopoly, as it takes in only the leading quarries. There still remain in the State many deposits of fine stone that will continue to be worked in a small way by independent producers.

A BEAUTIFUL MEMORIAL AT SLEEPY HOLLOW.

WHILE our American cemeteries are full of beautiful and elaborate memorials to the dead, it is rather strange that so little variety of design is shown in mausoleums and vaults. Most of these take the form of classical temples. This design is particularly suited for the purpose, and yet it gives a great degree of uniformity to our cemeteries. That a beautiful effect can be produced by a totally different style of design is shown by the illustration we present herewith. This represents a mausoleum which has just been completed in Sleepy Hollow Cemetery, at Tarrytown, N. Y., for Mr. John D. Archbold, of the Standard Oil Company. It will be seen that this is an extremely striking as well as a very beautiful mortuary structure. Its novelty of design in no wise detracts from the simplicity and dignity such a memorial should possess. It was built by the Troy Granite Company of Worcester, Mass., the material being the beautiful white granite taken from the quarries of the company at Troy, N. H. The size of the building on the ground is 36x36 feet and it is 32 feet high. It has a concrete foundation. The dome is entirely of granite, self-supporting, and the mausoleum contains twelve catacombs. The catacombs, fronts and walls are faced with selected foreign marble. The interior of the dome is lined with glass mosaic, and there is a marble mosaic floor. The doors are of richly wrought bronze. The entire structure is a tribute not only to the taste of the owner, but to the skill and thorough workmanship of the builders.

The Archbold mausoleum is only one of a large number of beautiful memorials that are to be found in this famous City of the Dead. Sleepy Hollow Cemetery is situated on the northern outskirts of North Tarrytown but a short distance from the river. It is in a territory that has long been settled and that took a prominent part in the early history of the State and colony. It has been used as a cemetery for many generation, and there are scores of gravestones still standing in a fair degree of preservation that were erected more than a century and a half ago. One of the most striking fea-

tures of the cemetery is the little Dutch church, still occasionally used for worship, that was erected in 1698 by a Patroon Philippse, the Lord of the Manor, with one of whose descendants, it is said, General Washington fell in love before he gave his heart to the Widow Custis. The graves of the early settlers nestle thickly around the little church. From the names that the gravestones bear it can be seen that a large proportion of them were of

THE ARCHBOLD MAUSOLEUM IN SLEEPY HOLLOW CEMETERY.

the sturdy Dutchmen who formed the first settlement along the Hudson. Many of the Revolutionary heroes are buried here, including one of the immortal trio who captured Major André. Further away, along the sides of the hills and in the valleys, are the more pretentious memorials of the later day inhabitants of this section. Within a distance of a few miles of the cemetery are the estates and country residences of a greater number of millionaires than can probably be found within any territory of equal size in the United States. Many of these people have erected costly memorials in this beautiful spot.

To all lovers of American literature Sleepy Hollow Cemetery is a place of pilgrimage. Near the crest of a hill directly above the little church is a large plot shut in by a thick hedge. It is almost completely filled with simple marble headstones. One of these that stands in the midst of the plot, and that is a trifle larger and more elaborate than the others, bears the simple inscription "Washington Irving," together with the date of his birth

and death. Through the entire English-speaking world the genius of Irving has made this territory famous. His old home, Sunny Side, is but a few miles away.

Sleepy Hollow is a fertile and pleasant valley running back between steep hills for several miles from the river. The cemetery which bears the name lies at the very entrance of the valley. Through this resting place of the dead runs the Pocantico River, which at the extreme edge of the cemetery issues from an immense and massive arched masonry viaduct which carries the Croton aqueduct over the stream. At the other end of the cemetery near the entrance is an old mill pond and dam and a dismantled mill, which figure so prominently in Irving's "Legend of Sleepy Hollow." It will be remembered that when Ichabod Crane, the village schoolmaster, fled in terror from the Headless Horseman he crossed the bridge by the old mill, and that his pursuer disappeared before the church was reached.

Charming as is all of the Sleepy Hollow region to the lovers of Irving, it has other claims to consideration. Upon its slopes were fought several skirmishes in the Revolutionary War, when General Israel Putnam, "Old Put," was in command. Just a few rods away from the cemetery entrance is a beautiful statue erected to mark the spot where Major André was captured. After the English spy's interview with Benedict Arnold at West Point, he was endeavoring to make his way to the British lines. He mistook his directions, which were to take the second road from the Hudson River, which would have been comparatively safe, and made his way down a little creek, still known as André Brook, on the crest of Sleepy Hollow, until he reached the Old Post Road, now known as Broadway. It was here that he was captured. Much of the upper part of Sleepy Hollow beyond the cemetery now forms a portion of the immense estate of John D. Rockefeller.

THE CRYSTALLINE ROCKS OF GEORGIA.*

THE road-building materials of the crystalline area of Georgia consist of granite, gneiss, diorite, quartzite, marble, massive quartz and trap rock. The granite is very generally distributed throughout the Crystalline area, where it occurs in the form of large intrusive masses in the gneisses and schists. These granitic masses often cover hundreds of acres, and occasionally, as in the case of Stone Mountain, form dome-shaped masses, having an elevation of several hundred feet above the surrounding country. Both the muscovite and the biotite varieties of granite occur in the Crystalline area; but the latter is much more abundant. In texture, these granites differ widely. They vary from an exceedingly fine-grained homogeneous, monumental stone to a very coarse-grained granite or pegmatite. The fine-grained varieties are quite extensively quarried at several localities in the State for building and monumental stone, and also for street-paving purposes. The physical tests, which have been made on these granites show that they have great strength, and are

*From the report on the "Roads and Road-Building Materials of Georgia."

therefore among the best of this class of stone for road material. However, it is not likely that they will ever become of general use for road surfacing where there is such an abundance of other materials of superior quality.

Gneiss is far more abundant in the Crystalline area than granite; and, as a general rule, it is much more suitable for road material. The gneisses are divided mineralogically into two well-known varieties, namely, the true gneiss, made up of quartz, feldspar and mica, and the hornblende gneiss, which contains, in addition to these minerals, hornblende as an essential constituent. Hornblende gneiss is generally superior to the true gneiss for road purposes, on account of its finer texture and greater toughness. It occurs,

A PAVING GRANITE QUARRY IN GEORGIA.

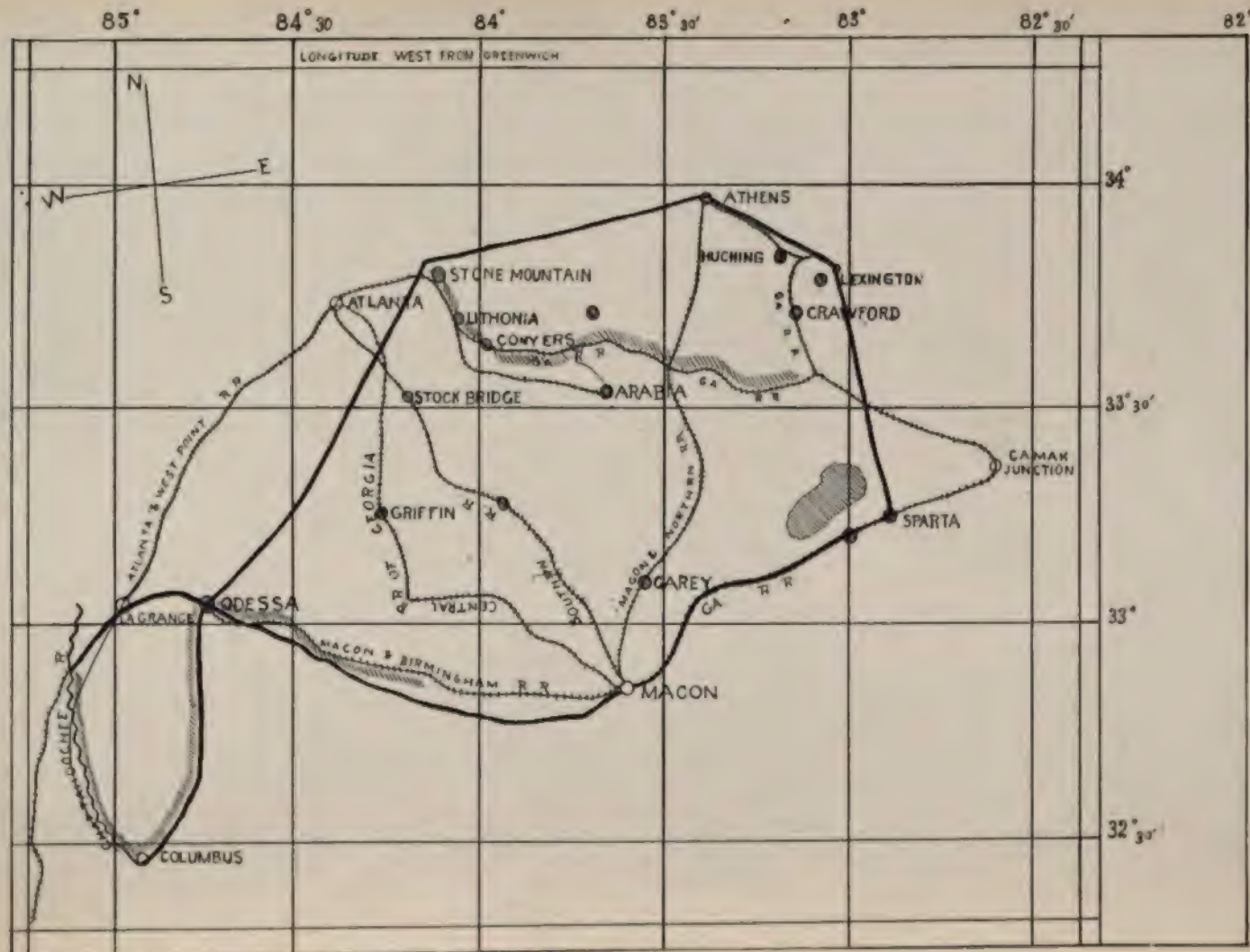
in places, throughout North Georgia, where it is found in narrow belts underlying the so-called red lands. The great amount of iron which the rock carries adds greatly to its binding quality. This class of stone has been used to a limited extent on the streets of Atlanta for macadamizing purposes. It wears well and is usually free from dust. The true gneiss makes a fair road-surfacing material, when it is fine grained and composed largely of quartz. Nevertheless, owing to the small amount of iron present, its binding property is always inferior to that of the hornblende gneiss.

Diorite, which is more or less abundant throughout North Georgia, is a green or dark-gray rock resembling very closely in general appearance both the hornblende gneiss and the hornblende schist. It occurs mostly in

the form of narrow belts or zones, intercalated with the gneisses and schists. The essential minerals of diorite are plagioclase and hornblende; but there are almost invariably other minerals present, such as pyrite and magnetite. It is always holocrystalline and usually fine grained. The most of the diorites in Georgia, so far examined by the writer, have a schistose or laminated structure, which has resulted from pressure in the process of mountain making. This structure, which is shown by microscopic examination to be due to the parallel arrangement of the individual minerals constituting the rock, has a tendency to weaken it along certain lines and thereby injure it for road macadamizing purposes. The diorites, when fine grained and not too distinctly laminated, make an admirable road material, second only to diabase. The toughness, hardness and binding quality of this stone are all excellent. A large exposure of this rock is to be seen on the Southern Railway, a short distance west of Dallas; and also at many other places, in the Crystalline area, which will be described in full in speaking of the varieties of stone suitable for road material in the several counties of the State.

Trap rock is very generally distributed throughout the Crystalline area. It occurs always in the form of dikes, which vary in thickness from a few inches to several rods. These dikes, which have originated from the filling up of fissures by molten matter forced up from below, have a generally northwest-and-southeast trend and a nearly vertical dip. They almost invariably cut the gneisses and the schists at a considerable angle, and rarely ever show any evidence of shearing or any crust movement since their formation. Geologically speaking, the dikes are all of recent origin. They probably date from the Juratrias period, and are presumably contemporaneous in origin with the Palisades of the Hudson and the trap dikes of the Connecticut valley. It seems quite likely that many of these larger dikes furnished surface lava-flows in many places of North Georgia during the Juratrias period. However, as far as the writer knows at present, there exists nowhere within the Crystalline area any remnant of such surface overflows by which this statement can be verified. This negative evidence, however, cannot be taken as conclusive, as such flows might have actually existed during the Juratrias period and have since been entirely removed by denudation. Prof. I. C. Russell, in speaking of the trap dikes, says: "In the greater portion of the area along the Atlantic coast that was fractured, so as to admit of the upward passage of molten rocks from beneath, extensive and deep erosion has occurred, and only truncated dikes and remnants of igneous sheets remain."

All the larger dikes of Georgia so far examined are usually quite uniform in thickness, and frequently extend for many miles with but few interruptions. A good example of the large dikes is to be seen in a cut on the Central Railway a few miles east of Newman. This dike continues for about 65 miles in a southeasterly direction, through Coweta, Meriwether and Talbot counties, finally disappearing beneath the Columbia sands, about four miles south of Talbottom. In this distance there occur a number of breaks or interruptions, a mile or more in length, which are due either to an actual discontinuity of the dike or its burial beneath the residual decay



THE GEORGIA GRANITE REGION.

from the including gneisses and schists. Parallel with the main dikes are usually found one or more small dikes, which may vary from an inch to several feet in thickness. The rock forming the smaller dikes is always fine grained, resembling very closely the contact edges of the larger dikes. When the dikes become of large size, as in the case of the one traversing Jones and Jasper counties, they frequently form low, well-rounded ridges whose surfaces are covered with innumerable rounded bowlders, varying from a few inches to many feet in diameter. In some instances the large dikes form cataracts or falls in small streams; but this is not of common occurrence. The best exposure of dikes is to be seen along the several railroads traversing the Crystalline area. Here they are frequently exposed in cuts, to the depth of twenty feet or more, and their relation to the gneisses and schists, together with their mode of weathering, can be easily studied. In such artificial excavations they are frequently more or less numerous. At one point on the Georgia Railroad, near Covington, there are to be seen, in a distance of less than two miles, as many as seven dikes in the various cuts. The smaller of these are so completely disintegrated to the depth of several feet that their presence is not indicated on the surface in the cultivated fields.

The rocks forming the trap dikes of Georgia are all typical diabase, consisting of plagioclase and augite, with a number of accessory minerals, the most common being olivine and magnetite. These rocks are of dark gray or black color, usually fine grained and quite difficult to break with a hammer. As a road surfacing material this class of rocks has no equal. Its great hardness and its remarkable toughness, together with its excellent binding quality, make it an ideal road-building material.

There are a number of localities along the several railroads of North Georgia where quarries of this superior road material can be opened up at a small cost, and the stone can be readily shipped to all parts of the State for both street and road purposes. The trap rock of the State is almost unknown, and, as a consequence, it has had no use in road construction.

Associated with the diorites and frequently indistinguishable from them, except by microscopic examination, are the hornblende schists. These rocks differ from the diorites mineralogically in that they have quartz as a constituent instead of feldspar. They are very abundant and quite generally distributed throughout the Crystalline area. The hornblende schists, like the diorites, occur in the form of bands or belts in the mica schists. These belts are usually narrow, but occasionally they expand to the width of several hundred feet. The rock is always laminated and fine grained. The less distinctly laminated varieties make a fair road-building material. These varieties are quite tough and give excellent service when used for road surfacing.

The mica schists, which are the most abundant of all the Crystalline rocks, are widely distributed. They consist of mica and quartz and are always distinctly laminated, which renders them practically unfit for road material.

The quartzites or sandstones of the Crystalline area are limited to a few localities. The most extensive exposures of this class of rocks form a chain of low ridges and hills extending from near Barnesville, Georgia, to the Alabama State line by the way of Warm Springs, Chipley and Hamilton. These sandstones are usually thin-bedded and occasionally flexible. In

A GEORGIA GRANITE PAVING QUARRY WITH CABLEWAY.

places they become quite compact and pass into hard quartzites. These rocks have been used to a limited extent in the vicinity of Pine Mountain for road material; but they are usually too friable to withstand the wear of traffic, and hardly deserve to be classed among the road-building materials. Similar sandstones or quartzites occur along the line separating the Paleozoic from the Crystalline area and also on Graves Mountain, an isolated monadnock located in the western part of Lincoln county.

Marble or crystalline limestone occurs in Cherokee, Pickens, Gilmer and Fannin counties, forming a narrow belt along the Atlanta, Knoxville and Northern R. R. The stone has been used to a small extent in the vicinity of Tate for road purposes, but owing to its coarse grain it is not well adapted for that use.

Quartz pebbles and bowlders, which have resulted from the breaking down the quartz veins, are very common throughout the Crystalline area. They are so abundant, in many places, as to interfere with the cultivation

of the soil. Large quantities of them have been used on the railroads for ballast, and in a few places they have had a local use for road macadam. They are poorly suited for the latter purpose, on account of their brittleness and their lack of binding quality. S. W. McCallie.

GRANITE IN GREAT BRITAIN AND IRELAND.

WHENEVER the granite situation in Great Britain is discussed by the newspapers of that country it is admitted generally that the old quarries which have long been worked, especially those in Scotland, have reached such a stage that suitable stone can no longer be raised at a profit. In almost every instance where this admission has been made, however, the writers have not failed to dwell upon the fact that there is still hope for the granite consumers in the British Isles without having recourse to American stone. All seem to fear that if an American invasion of stone begins, there is no telling where it may end. There has been a general prospecting of likely granite properties, and a few new quarries have been opened. Some quarries that produced a good grade of stone and were worked in a small way years ago, but that were abandoned because of difficulty in handling, have been reopened. One such deposit is that on Lundy Island, which lies at the mouth of Bristol Channel just north of Cornwall. This quarry was closed many years ago because of a lack of suitable anchorage where vessels could be loaded. Modern ingenuity has solved this difficulty, however, and a cableway, running directly from the quarry to a dolphin in deep water, has been installed. Inasmuch as the shortage in granite in England has been in all forms of the stone, even to rough stone for heavy masonry and paving blocks, this has given a stimulus for the opening of quarries that did not even promise to yield a high grade of building stone.

Shortly after the announcement of the plans for the widening of London Bridge it was said that the stone used in the work would come from this country. Owing to the great importance of the work and to the fact that it would be difficult to mention a single structure more intimately identified with English life than London Bridge, the announcement that Maine granite would be used created something of a sensation. American granite producers are not to have this signal triumph, however. It is not known whether the use of the American stone was actually contemplated, and has been given up because of the remonstrances of the British producers, or whether the announcement was merely an unauthorized rumor. The statement is now made on authority, however, that the stone for the widening of the bridge will come from the same quarries from which the granite was originally taken for the building of the structure seventy years ago. These are the famous Dartmoor quarries, which have been worked without intermission for fully a century. Messrs. Pethick, of Plymouth, who have the contract for widening the bridge, have held the lease of the Dartmoor land for twenty-five years from Sir Massey Lopes, and have the right of quarrying from an area of 1,000 acres. Among the many specimens of granite in the

office of this magazine the Dartmoor stone is entirely different from every other. It is rather light gray in color, but is not as uniform as most of the American granites in its crystallization. Some of the particles of quartz are fully an inch in size. The stone is pleasing in appearance and is very hard.

Most of the English writers who have discussed the situation seem to think that the greatest hope for resisting the invasion of American granites rests in the inexhaustible deposits of fine stone to be found in Ireland. As this magazine has shown, these deposits have recently been carefully investigated by experienced stone men, and all declare that the granite is of high

THE GRANITE SHIPPING PORT OF SCOTLAND.

quality, but that the difficulties of transportation seem to be insuperable at present. The work that is now being done in granite quarrying in Ireland is shown by an article in "The Quarry," based upon a study of Irish industries, recently published in the "Independent and Nation." Last month we quoted what the writer said concerning the limestone and marble industry, and he writes as follows of granite quarrying:

"Messrs. Charles Ewen & Sons, a firm established some 20 years back, and carrying on the business of granite merchants and monumental sculptors, have their quarries at Craigielea, Bothwell, and their showyard and offices at Monaghan street, Newry. The firm, which also produces polishing work, dressed granite of every description, and many churches and other public buildings, attest the merits of their work in different parts of Ireland. Paving setts and street curbing are also produced by them in considerable quantities and shipped principally to the English towns. Mr. A. H. Ewen, one of the sons of the late Mr. Charles Ewen, has opened quarries at Glenville,

Newry, from which granite of a very fine quality is produced in large quantities and converted into monumental and street work.

"The stone taken from the granite quarries of Mr. J. E. Emerson, situated at Drumcashlone, Newry, is principally used for monumental work and for architectural purposes. It takes a splendid polish, and is extensively manufactured into Celtic crosses, obelisks, headstones and plinths. Orders have been executed in all parts of the United Kingdom. The stone is entirely worked upon the premises and polished by steam power. Among many other commissions was one for a very beautiful cross sent to Wales and erected over the grave of Major Yelverton, the hero of the celebrated Yelverton trial. Mr. Emerson has branch depots in Lurgan and Banbridge.

"The stone taken from the quarries of Messrs. Samuel Howard & Son, which are situated at Gortnaglush, about two miles from Dungannon, is a nice brown color and free from discolorations. These quarries, which had been worked for thirty years by Mr. Robert Howard and his father, Mr. Samuel Howard, and which had been closed for the past eight years or so, have just been newly opened by Mr. J. Dickson. The stone is suitable for any building purpose. Mr. Dickson, who keeps a staff of stone cutters at work, can execute any orders for dressed stone work or roughly scabbled blocks.

"The celebrated Ballyknockan granite quarries, in the County Wicklow, have supplied the material used in the building of some of the first edifices in Dublin. Ballyknockan is situated about six miles from Blessington, on the Dublin and Blessington steam tram line, and is approached by some of the finest scenery in Ireland. The quarries were opened nearly 100 years ago, after the closing of the Golden Hill quarries, Kilbride, from which the stone for the erection of the Custom House, Russborough House, the palatial residence of the Countess of Milltown and other buildings was taken. The Ballyknockan quarries, particularly that of Mr. William Osborne, of Ballyknockan House, are amongst the finest in the three kingdoms. St. Audeon's Church, High street, Dublin, shows the capacity of Mr. Osborne's quarry for producing stones of huge dimensions. One of the kneelers already delivered there was over 12 tons in the rough, and will well repay inspection. And the same producing qualities also distinguish the adjoining quarries, belonging to Messrs. Daniel McEvoy and Joseph Brady. The Ballyknockan granite has been sent to nearly all parts of the world; the Cathedral of St. John, Newfoundland, has been largely built from it, and Sir Thomas's buildings, Liverpool, whilst it has also found its way to France. The material for some of the most magnificent buildings in Dublin was supplied from the quarries, including all the railway stations, St. Paul's, Arran quay; the Mortuary, Chapel and gateway, Glasnevin, Clonliffe College Church, Merchant's Quay Church and Library, and many other buildings, both public and private. In the provinces, Kylemore Castle, Clonakilty, Carrick-on-Suir, Augholiver and a large number of other churches were built of Ballyknockan granite. Mr. Robert Hunt, F. R. S., in writing of Ballyknockan granite, describes it as highly suitable for ornamental work, in addition to ordinary

building purposes. The granite rock in Ballyknockan is composed of feldspar quartz and mica, and occasionally crystals of different kinds are found in the stone, the larger completely enveloping the smaller specimens. On the mountain slope over the quarries there are some specimens of soap-colored and pepper and salt patterns, but not in sufficient quantities to be worked. The quarries give employment to about 200 hands, but this number could be largely increased if those occupied in building operations would exclusively patronize the home production. The whole range of mountains from Ballyknockan to Kylebeg has an inexhaustible supply of granite of the finest quality. On Kylebeg Mountain Mr. Patrick Lalor gets a very fine granite, and he is at present working for the Curragh and Kildare. The same may be said of Ballynaslochan, where Mr. Michael Curran has

SHIPPING CORNISH GRANITE.

his quarry, and where the Norton family conducted successful works for years. The extension of the tram to those great quarries would certainly be a very desirable and valuable improvement. In addition to the large quarry owners whose names have been mentioned there are also the Messrs. Freeman, O'Briens and Costelloe, who do all in their power to promote the trade in the district.

"The Moor quarries of Messrs. Hugh Campbell & Son, Newry, have acquired a very high reputation. The firm do a large trade in corporation work, such as setts and curbs; but they have a specialty of their own in supplying the English and Scotch markets with monuments polished and completely finished ready for the middleman's show yard. They are probably the only firm in Ireland doing a trade of that description. They also send large supplies into Dublin and other centers in Ireland. The Moor

quarry has been carried on by Messrs. Hugh Campbell & Son for about sixty years, and they are the oldest quarry owners in Newry. The Moor quarry, which is one of the finest in the north of Ireland, is about 80 feet deep and is worked on two floors. The firm not only produce the raw material, but they likewise manufacture it on the ground into monuments, building stones and other artistic work in granite. They have a monumental works equipped with a carriage, two verticals, and a double lathe for polishing purposes, where they employ about fifteen men. The handsome memorial to the late Lord Chief Justice of England (Lord Russell of Killowen), erected in the new cemetery at Epsom, was erected by this firm. This memorial takes the form of an elaborately dressed enclosure, with pillars at the corners weighing one ton each, and the workmanship reflects the greatest possible credit on the manufacturers. A new development has been inaugurated at Ballyverran, near Omeath, County Louth, for the purpose of providing a beautiful dark green granite. It is owned by Mr. Alexander Campbell, J. P., of Warrenpoint, of the firm of H. Campbell & Sons, Newry, and is nicely situated on the mountain side. The stone presents a very beautiful appearance when polished, and blocks of large dimensions can be obtained."

A SCOTCH GRANITE YARD.

Some months ago it was stated in these columns that certain Americans had made a careful examination of a few of the Irish granite deposits and believed that there was a great future for the industry in that country. Now

the announcement is made that men with means will go ahead and develop promising deposits. A writer in the Boston "Globe" says:

"Thomas Nevins, of Chicago, associated with a number of other Americans, has at last got a big scheme for the commercial development of Ireland into definite form. Half a million dollars have been raised to begin with, and concessions have been obtained for working the Donegal granite quarries. If the American market for this Donegal granite comes up to the hopes of the investors, operations will be enlarged to such a degree that the effect on the general situation of Ireland is likely to be considerable.

"American investors have been keeping an eye on Ireland for more than a year past. It has been felt that English capital has neglected excellent opportunities there, and that American enterprise might turn Erin's neglected resources into good investments, and incidentally put a stop to the steady emigration which is both an effect and a cause of Ireland's poverty.

"Some of the Irish members of Parliament are under the impression that this undertaking in Donegal is the beginning of this promised new era for Ireland.

"Nevins, who is now the occupier of 'Mt. Shannon,' in the county of Limerick, formerly the residence of Lord Clare, has had expert advice on the resources of Donegal, and the report was that there are immense formations of granite which for variety of shade, durability and general beauty excel the famous products of Aberdeen and Peterhead. White granite, which is very rare, is a product of the Donegal quarries, and there is also slate and marble in large quantities. Capt. Francis, an expert mining engineer and geologist, acting under instructions from the Earl of Shaftesbury, upon whose estates these quarries are, has reported that the Dungloe (West Donegal) granite embraces every variety of color and texture and adapts itself to monumental uses as well as decorative pillars resembling the famous 'Labrador,' which is so much employed in London buildings.

"These quarries cover an area of 100 square miles, and have hitherto been little exploited, want of capital having been the great obstacle. What has been obtained from them has been sent to Aberdeen or used for local purposes, and in the former case it has been sent to America as Aberdeen granite.

"The promoters count on exporting $250,000 worth of this granite annually to America at the rate of output provided for by the present plans. They will provide weekly employment to about 200 men. A point in the syndicate's favor is that vessels from America discharging grain at Londonderry often have to return in ballast, and have to buy for that purpose clay, which is thrown overboard at New York. In consequence, ship owners would find it profitable to carry granite, instead of clay, at as low a rate as 60 cents a ton—about the same rate for 3,000 miles that it will cost to get the granite by rail from the quarries to Londonderry—a distance of some 25 miles.

"It is said some of the money that goes into this new scheme was originally destined for the much-discussed short steamship route from Narragansett Bay to Berehaven. Richard Croker's cousin and namesake was pro-

moting that scheme, which is now said to have been abandoned for lack of sufficient backing. Croker is now interested in this Donegal plan, and it was he who enlisted the subscriptions obtained from Tammany men.

"John Redmond and other leaders of the Irish Nationalist movement sympathize with the Donegal scheme, and have intimated that they are willing to lend the promoters every assistance.

"Edward McFadden, one of Donegal's Parliamentary representatives, said to the writer: 'I believe the scheme will be the beginning of a movement that will benefit Ireland materially, even if it only shows to the world that our country possesses resources capable of development to the advantage of our people and the financial gain of the investor.

" 'Donegal offers exceptional facilities for the exploitation of its granite quarries. The supply is unlimited, and the beds are so situated as to render them most accessible. The harbor at Burton Port is capable of receiving ships of any tonnage, so that the cost of transport between the quarries and the harbor would be infinitesimal. Labor would be exceedingly cheap.

" 'Men whose time would cost in Aberdeen from $6.50 to $10 a week could be obtained in Donegal for from $3.75 to $5 a week. In fact, everything is in favor of working the quarries successfully, and with proper machinery for polishing purposes, granite superior to anything Aberdeen can produce could be landed in America at least 20 per cent. cheaper than the Scotch article.'

"Mr. Nevins, who is the moving spirit in the present scheme, is associated with Yerkes in his electrical railway undertakings both in America and England. Mr. Nevins, having now made his home in Ireland, is taking an active interest in local affairs. Disgusted with the filthy condition of Limerick city, he has made an offer to the corporation to pave the streets with either wood or granite, and to take as security for his capital a charge on the rates to extend over 40 years."

"AMERICAN METHODS" IN THE BUILDING TRADES.

THE English newspapers still continue to discuss without abatement of interest the relative merits of English and American manufacturers and the methods of the workmen of the two countries. A few writers are frank enough to admit that English machinery is capable of improvement, but most of them are free in putting the blame for the decadence of manufactures on the British workmen. It is a strange fact that the most vigorous defense of the English union workmen that has appeared recently came from an American. This was Mr. Stewart, in charge of the construction of the great works of the Westinghouse Company in England. His record of the work that was done by the union bricklayers under competent and energetic direction was so complete and detailed that it carried instant conviction. His conclusions have already been printed in these columns. It is, perhaps, cruel to suggest that the logical deduction from Mr. Stewart's experience is that English

workmen can give a good account of themselves if they are under American direction and if our devices are used to expedite the delivery of material to them. The great trouble with the ordinary English superintendent is that he is utterly lacking in initiative and is guided wholly by precedent.

A very intelligent and wide awake engineer who recently came to this country went about with his notebook in hand jotting down the striking things he saw in the mechanical and building line. One of the things that impressed him, as it does all who study the subject, was the lightness of American machinery and apparatus as compared with the English, a lightness that means no sacrifice of strength. He noted this lack of clumsiness and heaviness even in the push carts of the street peddlers, or, as he called them, "costermongers' barrows." He watched the demolition of an old building, and was struck with the rapidity with which the refuse was removed. He commented admiringly on the lowering of old brick and mortar in a basket. In England, he declared, the basket would be lowered hand over hand. Here a workman sat with heavy gloves on his hands grasping the rope and allowing the basket to go with a run until the street level was reached. It is apparent that English superintendents and workmen need to be stirred up to think and act for themselves, if so simple a thing as this calls out comment.

In this country we always encourage the workman to think for himself, and his suggestions are listened to with attention and given a fair trial. In one of the largest manufactories in the Middle West, the workmen are incited to plan better methods by a direct pecuniary reward for each improvement that is adopted after trial.

One has only to watch building operations in this country to see how much our workmen think for themselves and to realize how many improved methods, especially in the way of handling material, have come about through their suggestion. The entire steel work in a twenty-two story building on Broadway was recently completed in the marvelously short space of time of five weeks. If the men had been under one of the old-fashioned superintendents, who insisted on doing everything by rule and rote and demanded a well established precedent for everything, the time required would have stretched to twice this period.

A most striking as well as amusing instance of what might be called the "American method" was recently seen in the Hall of Records, now being erected in this city. The building has already reached the fourth floor, where immense derricks and hoisting engines are at work. A load of coal for these engines drove up to the building. There was a moment's hesitation while the workmen looked from the coal to the engines above. Then as if it were the most natural thing in the world, the horse was unhitched from the wagon, ropes were passed under the axles and tied securely, the engines were started, and the derrick slowly swung the entire load of fuel, wagon and all, up to the fourth story. There the coal was dumped, the wagon was lowered to the street, the horse was hitched up once more, and the driver drove away as unconcerned as if he had delivered his load by a chute into the cellar. There was no danger in the method, for the derricks had been tested by the hoisting of a forty-ton column into place

a few minutes before. This was a small matter in itself, but it means much as an indication of national characteristics. The English writers who deplore the fact that that country is not keeping pace with America in its manufacturing industries, and who are inclined to attribute the blame to the tyranny of the trade unions, may well stop to consider whether much of the fault is not due to that curse of English life, "precedent," and to the conservatism and narrow mindedness of employers and superintendents.

ARIZONA MARBLES AND SOME OTHERS.

NATURALLY enough the discoveries of the mineral resources of far distant States and Territories are in advance of the facilities for getting the products to a profitable market. Prospectors are busy everywhere, and they have found many deposits of stone that are undeniably valuable for structural or decorative purposes. In a few cases quarries have been opened in a small way, but the difficulty and expense of getting the stone to the market have soon put a stop to operations. In other cases efforts have been put forth to organize companies to work these deposits with sufficient capital to construct the necessary lines of transportation. The amount of money that must be expended before any adequate returns can be expected is so enormous, however, that capital is timid in seeking the investment. When either of these courses is followed the promoter generally loses heart under discouragement, and it frequently happens that deposits of valuable stone are neglected even after the marvelous growth of our transportation facilities has rendered them available. Many instances of this sort can be found in the far Western and Southwestern States. A striking example will immediately recur to many stone men in the case of a beautiful green marble found some years ago in the far West. This is a genuine marble of excellent texture and rich coloring, and not a serpentine. The stone was specified for a certain building in New York, and the people who were in charge at the time had the pluck to carry the job through, although it spelt "failure" for more than one. The result is one of the most beautifully decorated marble rooms in America, one that calls out most enthusiastic praise from every one who sees it. But the quarry is no longer operated, and this exquisite marble is out of the market.

For years it has been known that there were in Colorado deposits of marble of rich and brilliant color. It is true that the marble is not as sound as many other deposits, but if it were available, by reason of transportation facilities, enough blocks of suitable size could be obtained to make the quarrying of it a paying venture. In the office of this magazine are samples of Colorado marble in the richest red, yellow, fawn and chocolate colors. They are all handsomely veined and mottled and take the highest polish. They would be admirably suited for decorative purposes. For years efforts have been made to develop the quarries, but the original proprietors lost courage and desisted from their attempts. Year by year, however, the railroads have gone nearer and nearer to the deposits, and it is certain that the time will soon be ripe for putting these beautiful marbles on the market. There is

also in the State a pure white marble of the statuary variety that will do much toward the replacing of Carrara, if it could be brought to the seaboard.

Arizona is a Territory that has figured very little as yet in the stone production of the country. But it has long been known that it has stone resources scarcely to be matched elsewhere. For years a familiar figure among the stone men of New York was one tireless and enthusiastic promoter, recently dead, who sought to interest capital in the development of a peculiar Arizona stone deposit. The discoverer gave this the sounding name of "Olympian marble," although it had nothing of the nature of marble, save perhaps its color. It is a liver rock, very much resembling in texture lithographic stone. Indeed a portion of the deposit is a high grade lithographic stone which has been used with success for this form of engraving. What gives the stone distinction is that it is found in such a wide range of colors. There are bright reds, pinks, yellows, greens and the various intermediate tints, both in solid colors and in mottled effects. The stone is very dense and takes a high and durable polish. Inasmuch as it can be used for lithographic purposes, it is apparent that it can be carved readily, and some specimens that have been sculptured exceed in delicacy of effect almost anything that can be shown in stone work. The difficulty of transportation is the only thing that has prevented the putting of this stone on the market. When the deposits can finally be reached by the railroads it is certain that a wide use can be made of the stone for interior decorative purposes. Any one who has seen that large and impressing collection of samples now shown in New York City cannot deny the beauty of the stone.

Some months ago mention was made in these columns of a remarkable deposit of marble that had been found in Arizona. Samples of the stone can still be seen in the office of this magazine. Aside from their beauty they are remarkable for the wide variety they show in a single deposit. The colors run from black to pure white. There is black with white mottling and with white veins and black with yellow veining. There is a blue that is similar to the Vermont blue. Very beautiful indeed is a white that is mottled with light pink and traces of yellow. Another white has heavy clouds of black. Perhaps the most interesting specimen of all is a white that is very translucent with a faint pinkish tint and having narrow, strongly marked veins of black. This has much the same general effect as Pavonazza and would be largely used like the latter for interior decoration. While all of these marbles are beautiful in themselves, it is doubtful if some of the commoner varieties could ever pay the freight rates that would be necessary to bring them to the New York market. Several, however, would bring such a price that they could stand any reasonable freight charges. Nothing has been done with this deposit as yet, and it is possible that it will be compelled to wait until the railroads have made further advances into the territory. It would seem, however, as if there was enough in the marble to warrant an immediate development.

Particulars of a new deposit of onyx marble are given by a recent newspaper dispatch from Prescott, Arizona. The writer says: "A very large deposit of white onyx has been found in the Baca land grant in Yavapai

county, recently purchased by an English syndicate headed by Lord Thurlow. Several specimens have been brought here.

"One of them, weighing fifty pounds, is of solid creamy white. Another is the usual variegated onyx common in this section.

"This is said to be the only bed or deposit of white onyx known. It is without a flaw or a crack.

"The vein or layer is five feet thick and is covered by 250 feet of limestone, which probably accounts for its solidity and freedom from cracks, flaws and discolorations.

"Slabs of almost any marketable length can be taken out. In some places the deposit is eight feet thick, and it is known to extend 800 feet in one direction and 1,000 in another.

"Mr. Carnegie's new house is to be trimmed with this white onyx, polished, and the fifty-pound block will be sent to him."

"MONUMENTAL" AND "BUILDING" GRANITE WORK.

IN most of the disputes that arise over granite cutting the trouble generally has its origin in bush-hammered work, as to whether the stone is actually six or eight or ten-cut work as called for by specifications. Every stone man will remember the charges that were made by the union cutters concerning certain public work in Chicago, in which this point was raised. The charge was made that the cutting of certain stones was not as fine as called for by the specifications. An unusual case, based upon the difference between "monumental" and "building work" has found its way into the courts in Rhode Island. In the Common Pleas Division of the Supreme Court of that State, A. C. Morrison brought suit against John Bristow to recover for stone vases furnished for ornamentation of the gateway at "Bass Rocks," the Narragansett estate of Thomas Wanamaker. The plaintiff is a resident of Connecticut. Before the first witness was put on for the plaintiff the counsel for the plaintiff asked that a view might be taken of the vases now set up at the Wanamaker estate. Mr. Olney, counsel for Mr. Bristow, said he did not think a view was necessary, as he had a specimen of the vases and caps in the Court House. The presiding Justice deferred decision.

Andrew Morrison, the plaintiff, was the first witness. He said he was a resident of Stonington, Conn., had been a contractor and employer of men in the granite cutting business for the past five years. At this point the contract was read, setting forth that six urns and caps were to be cut out of red granite, six-cut bush hammer after design by N. J. McCarty, architect, for placing at the gate posts of the entranceway to the estate of Thomas B. Wanamaker, at Narragansett Pier. That the sum of $463 should be paid for the work, and a proportionate part of said sum to be paid on the delivery of two each of the urns and caps. The witness, continuing, stated he had received $200 of the contract sum.

In cross-examination the witness, while not denying that the spherical shape of the caps was not as perfect as it might have been, said that it was

perfect in accord with usual six-cut work; that was not supposed to be as perfect as eight or ten-cut work. Mr. Olney had a plan drawn by an engineer showing that the globes were cut out of drawing, blue and red lines demonstrating the difference between the granite sphere as cut and as it should have been to make the ball practically round. The witness denied that Mr. Bristow refused to pay for some of the vases and caps on account of the imperfect cutting. Later the witness admitted that subsequently he sent men down to the Wanamaker estate to make improvements on the set-up caps, not that the witness thought the caps required improvement for the work contracted for, but simply to please Mr. Bristow, who was acting as an agent for Mr. Wanamaker.

Besides one of the balls or caps on exhibition that presented a rather lop-sided effect from a short distance, which, however, might not be noticed when elevated on one of the high gates; the bush hammer, for the six-cut work was also on view. This tool is manipulated by the workman as an ordinary hammer, although much heavier than even the ordinary sledge variety.

A question came up as to the plaintiff's being required in work of this character to keep to the exact measurement as laid down in the contract. The plaintiff's attorneys tried to show that "practically exact" was all that was sufficient. The Court ruled that the reasonably exact measurements as in the contract must be shown to have been carried out in order that the contract remain in full force.

During the plaintiff's testimony he exhibited with a model how the measurements were made, and gave an explanation as to the methods employed in doing cutting of this sort. Another question coming up as to whether, if Mr. Wanamaker accepted the stones, that would be sufficient, the Court ruled that if the contract was between the plaintiff and defendant it must be shown that the defendant accepted the stones.

The stone was then measured by stone cutters' instruments and patterns, and the globe was out of drawing. Mr. Morrison, however, maintained that the work was correct when the six-cut class of work was considered.

Edwin King was the next witness for the plaintiff. He said he was a professional stone cutter, works for himself, and had cut some of the work in question.

Witness thought the urn, ball or whatever the rounding stone piece may be designated, was good work for six-cut work, although not up to the measurements. He said it would be practically impossible to make the measurements at all exact on red granite, so called, although it is of a bluish appearance, with the tools used in so coarse work as that of the urns. Witness thought that the measurements given in this class of work might be maintained within one-quarter of an inch.

Bismarck Keege was one of the men who worked on the Bristow-Wanamaker urns. He thought the work was fairly good. Keege was the man who attempted to improve the symmetry of the urns after they had been set up. Some of the globes required more manipulating than others. He left after he had done all that he thought necessary. Keege was asked if this

kind of work was not ornamental stone work. "No," said the witness, "I do not call it monumental." "'Ornamental,' I said," replied the counsel. "No," said the witness, "I call it building work."

Mr. Justice Blodgett asked what the witness would call the stone work in which figures are represented on view and upon the Stone villa at Newport. Witness said he had never seen the villa in question, but thought it would be called "carving." Mr. Crafts remarked that there was a "marble language" among stone cutters.

Michael Burke was a stone cutter of 18 years standing and worked on the base of some of the urns. Thought the work was satisfactory. Did not think the urns could be called monumental work because the work was too coarse. Said that amongst stone cutters monumental work was the same as ornamental work.

At this juncture T. G. Hazard, Jr., Representative in the General Assembly from Narragansett and a civil engineer, said he made measurements of the urns and found them all out of drawing, taking measurements by sections north and south. The witness then gave a detailed account of the variations in the dimensions of the globes and what their correct dimensions should have been according to the contract. The inaccuracies, the witness said, were not alike in any one of the balls, all of which were not up to the measurements. The witness incidentally was not highly impressed with the symmetry of the globes. He said that when he first saw them he thought they were stones formed by nature and taken from the beach.

NORTH AMERICAN GEOLOGICAL FORMATION NAMES.

IN Bulletin No. 191 of the United States Geological Survey, now in press, Mr. F. B. Weeks gives an exhaustive discussion of North American geologic formation names, their bibliography, synonymy, and distribution. The publication contains (1) A list of all North American sedimentary formation names; (2) a list of the names used to designate a particular stratum or aggregate of sedimentary strata within the area of North America; (3) a list of the geographic names that have been applied to masses of igneous rocks occurring in North America; (4) an index list of formation names. The handling of the material is such that this work includes not only a list of formation names and their synonymy and correlations, as given by authors, but also serves as a bibliography of the literature describing each formation.

The work of preparing this bulletin has been in progress for nearly three years. During the winter of 1899-1900 it became evident that this work must be completed at once for the use of members of the United States Geological Survey in assigning names to the formations which were being delineated on the folios forming the geologic atlas of the United States, and hence the Director of this Survey requested the following geologists to assist in completing this work: Messrs. M. R. Campbell, N. H. Darton, J. S. Diller, G. H. Girty, C. W. Hayes, F. H. Knowlton, F. L. Ransome, G. O. Smith, A. C. Spencer, T. W. Stanton, J. A. Taff, T. W. Vaughan and David White.

The literature that then remained to be examined was therefore apportioned among these gentlemen, and since that time the material has been brought down to January 1, 1901, by the author.

The duplication of formation names has become a serious matter, and it seems most desirable that in the future there should be no further duplication; consequently Mr. Weeks suggests that in determining the names to be applied to formations the laws of priority and description (general usage) should be observed, and that the name first given to a definite formation or series of strata should hold unless it becomes superseded, in which case the first name should be dropped for this formation; and where there can be no question as to the general usage of the subsequent name, the first name might be used again for a different formation.

As an illustration, the name Berkshire limestone was first applied to certain limestones in western Massachusetts. Subsequently the name Stockbridge limestone was employed to designate this formation, and has since come into general usage for this subdivision of the Cambrian in that region. The name Berkshire limestone has therefore become obsolete, and the name might be used to designate some other formation without creating confusion.

CHALK OF SOUTHWESTERN ARKANSAS.

THE chalk and chalk-marl deposits of Southwestern Arkansas, said Mr. Joseph A. Taff, in Part III of the Twenty-second Annual Report of the United States Geological Survey, now in press, were first described by Mr. Robt. T. Hill in the Annual Report of the Geological Survey of Arkansas for 1888, in which volume Dr. J. C. Branner, then State Geologist of Arkansas, briefly described the manufacture of Portland cement and showed that the chalk deposits compared favorably with the best English chalk as Portland cement materials. The publications of the Arkansas Survey called attention to these chalk deposits, and as a result an extensive Portland cement plant was established at Whitecliffs. This development caused greater interest in the Arkansas chalk deposits, creating further demand for information.

The chalk deposits of Southwestern Arkansas occur in a low rolling plain from the vicinity of Rocky Comfort, about 50 miles from the State line, northeastward towards Arkadelphia. It is the northeastward part of the great chalk formation which extends from Central Texas into Arkansas. The purer chalk outcrops in three separate areas, (1) at Rocky Comfort in Little River County, (2) Whitecliffs in Little River and Sevier Counties, and (3) eastward from Saline Landing in Howard and Hempstead Counties. The chalk in these areas belong to the same formation and are separated by later deposits of gravel and sand.

The pure chalk formation has a variable thickness from more than 100 feet in the western part of the area to thin deposits in the eastern part. It occurs in the midst of fine chalky and clay marls into which it grades with gradual change. Throughout its occurrence it is well exposed and suitably located for exploitation. The Rocky Comfort chalk lies within one mile of the Arkansas and Choctaw railroad, which extends westward from the main line of the Kansas City Southern at Ashdown. The Whitecliffs chalk outcrops in cliffs and bluffs above Little River, where it is well and conveniently exposed for use in the manufacture of cement near the cement works. A branch road connects the Whitecliffs deposits with the main line of the Kansas City Southern railroad at Wilton. The Saline Landing area lies between the Arkansas and Louisiana and West Saline River, and ten miles from the main line of the St. Louis, Iron Mountain and Southern Railroad. The chalk at Saline Landing is at the head of navigation for small steamers on the Saline River and is separated from the chalk at Whitecliffs by a space of about 4½ miles.

Lying above the pure chalk of the Whitecliffs formation and separated from it by nearly 200 feet of marls, there is a formation of chalk-marl known as the Saratoga chalk-marl. This formation occurs in three separate areas, one extending from the vicinity of Saline Landing northeastward beyond Washington, another in the region of Okolona, and a third in the Deciper Creek valleys near Arkadelphia. This chalk marl formation resembles

closely the lower and more sandy portions of the Whitecliffs chalk. This formation continues throughout its known occurrence with little variation in thickness of about forty feet.

Mr. Taff's report discusses briefly the nature of natural and Portland cements and their methods of manufacture, giving analyses of both natural and Portland cements, also of the various chalks, marls and clays in the Arkansas region which show that a considerable part of the chalk deposits in Arkansas approach very closely in composition to natural and Portland cement limestones which have been utilized in France and in the eastern part of the United States. A large part of the chalk, however, is shown to rival the purest chalks in England which have been used in the manufacture of the highest grades of Portland cement. To the pure chalk for Portland cement it is necessary to add clays or marls carrying a large percentage of clay. Clays of the very best grade are found in the tertiary deposits lying immediately south of this region and further east along the St. Louis, Iron Mountain and Southern Railroad toward Little Rock. The fine textured marls which occur here associated with the chalks are shown by their analyses to contain clays adequate when mixed with the chalk to produce a proper combination for a high grade of Portland cement. It is evident that there is sufficient chalk and marl in the Arkansas region to produce an unlimited amount of Portland cement.

The nearest Portland cement manufactories occur in North Texas and Kansas, leaving the whole region of Indian Territory, Oklahoma, Arkansas, a large part of Louisiana, and other Southern States east of the Mississippi, which could be supplied with little competition by the Arkansas cements. Transportation north and south is direct by the Kansas City Southern, northeast and southwest by the St. Louis and Iron Mountain, and east and west by the Choctaw, Oklahoma and Gulf, and the Memphis and Choctaw Railroads.

FLUORSPAR FOR FLUXING.*

FLUORSPAR, or fluorite, is generally found in veins in limestones, sandstones, mica slate, clay slate, and gneiss. Although widely distributed, this mineral has been found in commercial quantities in but few localities in the United States. Until 1898 the only source of fluorspar in the United States was the mines in Hardin and Polk Counties, Southern Illinois. The same general geological formation extends over to Western Kentucky, and in 1898 deposits of fluorspar were discovered around Salem, Livingston County, and Marion, Crittenden County, Ky. A small amount of fluorspar is also obtained from Caldwell County, Ky. In a number of cases by-products are obtained, as galena, which is saved by the Rosiclaire Lead and Fluorspar Company, the largest operators of the mines in Illinois, and as zinc carbonate, obtained by the Chicago Mining Company from their mines in the vicinity of Marion, Crittenden County, Ky. The Kentucky Fluorspar Company, the Fluorspar Company and the Western Fluorspar Company have opened mines in Crit-

*From advance sheets of "Mineral Resources of the United States, 1901."

tenden County, Ky., and are now producers of this mineral. The Eagle Fluorspar Company is producing from deposits in both Crittenden and Livingston Counties, Ky. Fluorspar deposits have recently been discovered in Smith, Wilson and Trousdale Counties, Tenn.; and the Tennessee Fluorspar & Mining Company has been incorporated to work deposits near Bellwood, Smith County. In the vicinity of Dome, Yuma County, Ariz., fluorspar occurs abundantly. If the demand for the use of fluorspar for smelting purposes increases, there will be a market for these Arizona deposits. Formerly the chief use of fluorspar was in the preparation of hydrofluoric acid, but only a small amount is now used for this purpose.

The use of fluorspar in the manufacture of opalescent glass is increasing. By far the greatest use of fluorspar is as a flux for iron, in which use many advantages are claimed for it and it is rapidly superseding limestone. Fluorspar can be used to advantage, probably, in copper smelting and in reducing many other metals. The total production of fluorspar in 1901 was 19,586 short tons, valued at $113,803, as compared with 18,450 tons, valued at $94,500 in 1900. The average price per ton reported for the product of 1901 was $5, the same as in 1900. The amount of the ground fluorspar sold in 1901 was 3,700 tons, valued at $34,100, as compared with 3,000 tons, valued at $17,000 in 1900—an increase of 700 tons in amount, but of $17,100 in value, the increase being due to the low price of ground fluorspar in 1900, which was only $5.66 per ton; whereas, in 1901, the average price reported for ground fluorspar was $9.03. JOSEPH HYDE PRATT.

THE PORTLAND CEMENT INDUSTRY IN MICHIGAN.

THE history of the Portland cement industry in Michigan begins, says Prof. Israel C. Russell, of Ann Arbor, in Part III. of the XXII. Annual Report of the United States Geological Survey now in press, with the year 1872, when the Eagle Portland Cement Company built a cement plant about two miles northeast of Kalamazoo. The factory was continued in operation until about 1882, but no traces of the kilns are now in existence. Some 3 miles of sidewalk were put down in Kalamazoo with this cement, and after 15 or 20 years of use are still in excellent condition. The next factory for making Portland cement was erected by the Peerless Portland Cement Company, in 1896 and 1897, at Union City, and was followed by the erection of the factories of the Bronson Portland Cement Company at Bronson, in 1897, and of the Michigan Portland Cement Company at Coldwater, in 1898.

Portland cement is an artificially prepared substance which has the property of hardening in the air or water when mixed with the suitable proportion of water, and of remaining hard when immersed in water. In its manufacture, a mechanical mixture of finely pulverized limestone or marl and clay or ground shale is calcined, or burned, as the common expression is, and the resulting clinker is ground to a fine powder. This is the Portland cement of commerce. In addition to the raw materials, which enter directly

into the composition of Portland cement, fuel is necessary for burning them. For this purpose, in upright kilns crushed coke is generally used; and in the rotating kilns a jet of gas, of petroleum, or of finely pulverized coal is forced in by means of an air blast. The type of kiln now almost universally used in America consists of a steel cylinder about 60 feet long and 6 or 7 feet in diameter, lined with refractory material. These furnaces are rotated rapidly in a nearly horizontal position. The cement is manufactured by what are known respectively as the "wet" and the "dry" processes. In the wet process the finely ground limestone and clay are mixed with about 60 per cent. of water, and this "slurry" is caused to flow into the higher end of the rotary kiln in a small stream. In the dry process the "slurry" is only sufficiently moistened to prevent it from being blown away as dust. As the "slurry" travels down the cylinder, it is raised to a white heat; and the resulting clinker runs from the rotary in a continuous stream of white-hot pellets, which, after cooling, are ground to a fine powder. The cement as it comes from the grinding machines, is of such fineness that from 90 per cent. to 98 per cent. of it should pass through a sieve having 100 meshes to the inch. It is then ready for use, but usually improves with age.

Portland cement is used in making the foundations for lighthouses, piers, abutments of bridges, for linings of cisterns, and for many other purposes, and a growing use is in the construction of buildings, and especially of dwellings.

The raw materials which enter into the composition of Portland cement thus far used in Michigan are limestone, marl, shale, clay, gypsum and fuel. One of the limestones used is the Dundee limestone, extending in a belt from about 2 to 9 miles wide northeast and southwest across Wayne, Monroe and Lenawee counties in the southeastern corner of the State. The stone is found also at the extreme northern end of the southern peninsula. The best Dundee limestone thus far discovered is extensively quarried at Sibley and Bellevue, near Trenton, in Wayne County, and is used by the Michigan Alkali Company for making Portland cement at Wyandotte. Another group of limestone rocks, the Traverse group, crosses Wayne and Monroe counties in a belt about 2 miles wide, and crosses also the northern end of the southern peninsula from Alpena, on the border of Lake Huron, to Frankfort, on the shore of Lake Michigan. This limestone is utilized at Alpena by the Alpena Portland Cement Company. Another limestone group, the Monroe formation, is extensively quarried in the southeastern part of the State, but its adaptability for the manufacture of Portland cement is doubtful as yet. The limestone of the Michigan series outcrops at Bayport and Sebewaing in Huron County, on the east side of Saginaw Bay on the Charity Islands, at Bellevue in Eaton County, and near the Portage River, 5 or 6 miles north of Jackson.

The marl beds of Michigan occur in abundance throughout the southern peninsula, and are known to be present also to the north of the Strait of Mackinac. These marl beds vary in extending from a few acres up to hundreds of acres, and, in many instances, for an average depth of 20 feet or more.

The shale used by the Alpena Portland Cement Company is quarried about 7 miles north of Alpena and near the shore of Lake Huron. The Coldwater shales are now quarried at a locality about 1½ miles east of Union City, and are utilized by the Peerless Portland Cement Company. The Antrim shales are exposed on the shore of Thunder Bay and also at several localities in Charlevoix County, though they have not, as yet, been used in making cement. The Saginaw shales are found in several mines near Saginaw and Bay City, and at Flushing. The Lake clays of Michigan, suitable for cement making, are distributed about the border of the southern peninsula, for example, between Detroit and Ypsilanti, about Port Huron, South Haven, Whitehall, over the Saginaw Valley, and also in numerous local basins throughout the State; but it should be noted that, in general, the surface clays of the southern peninsula are not well adapted for making Portland cement, although some of the stony clays, if crushed sufficiently fine, may be used for that purpose. It is commonly found desirable to add a small per cent. of gypsum to Portland cement clinker before grinding. Michigan possesses extensive deposits of gypsum, particularly at Grand Rapids; and it is from that place that most of the Portland cement factories in this State derive their supply of gypsum.

The fuel used for heating the rotary kilns is usually bituminous coal, which has been thoroughly dried and ground to a fine dust. This dust is driven into the lower end of the kiln by means of an air blast, and on ignition produces a jet of flame some 15 feet long. Both crude petroleum and pulverized peat have been used, but coal dust is regarded as the best fuel.

The Portland cement industry has had a favorable development in Michigan in the last few years. The Bronson and Peerless Portland cement companies began operations in 1897, and by May, 1901, 10 factories were producing cement, and 6 others were in process of construction. The capacity of the 10 plants now built is about 2,400,000 barrels of cement per annum. The capital stock of all the Michigan Portland cement companies now organized is about $25,000,000, and their estimated capacity is, approximately, 8,600,000 barrels of cement per year. The total consumption of Portland cement in the United States during the year 1900 was between 10,000,000 and 11,000,000 barrels, and the amount manufactured was nearly 8,500,000 barrels. It would seem, then, that Michigan is preparing to supply a demand which does not appear to exist as yet, and as there is a similar activity in this same direction in several other States, it would appear to be evident that the Portland cement industry is in a speculative stage.

THE MINING OF ASBESTOS IN THE UNITED STATES.*

TWO distinct minerals are mined and sold under the name of asbestos; one, a silicate of calcium and magnesium, is a variety of amphibole, and the other, a hydrous magnesium silicate, is a variety of serpentine known as chrysotile. They are equal in their heat-resisting qualities, but the chrysotile variety is the superior in strength and elasticity of fiber and therefore commands a wider market. The chrysotile fibers are shore, varying from half an inch to two and a half inches in length; amphibole fibers have been found that were three feet long. Amphibole asbestos occurs in quantity in several localities; but at the present time the Sall Mountain deposits at Santee, 12 miles northwest of Clarksville, White County, Ga., are the only producers. A new deposit which promises well, had been developed at Northwest, Habersham County, Ga.; and on Tyron Mountain about one and a half miles west of Skyuka, Polk County, N. C., amphibole asbestos has been found in a series of pockets. A promising occurrence has been found in Bedford County, Va., about 12 miles southeast of Bedford City.

Known deposits of chrysotile asbestos are few, at the present time the only ones being those in Canada, Vermont, Wyoming and California. Practically all the chrysotile asbestos used in this country and Europe is obtained from the deposits at Black Lake and Thetford, near Sherbrooke, Ontario, Canada. The mining is obtained frof the deposits at Black Lake and Thetford, near Sherbrook, Ontario, Canada. The mining is by no means of open quarries. The new uses and the consequent constantly increasing demand for chrysotile asbestos should result in the enlarged production of this material in the United States in 1902, the year 1901 having been what may be called a year of development work. The Vermont deposits are located in the northern central part of the State, on and near Belvidere Mountain, in the towns of Eden, Lamoille County and, Lowell, Orleans County. There are four companies operating in this vicinity: the New England Asbestos Mining and Milling Co., on the south side of Belvidere Mountain; the National Mining and Developing Co., on the southeastern side of the Belvidere Mountain; the Tucker Asbestos Co., on the eastern slope of Belvidere Mountain, all in Lamoille County, and the Vermont Asbestos Co., two miles northeast from Lowell Village, in Orleans County. The mining here also is by means of open quarries. The Wyoming deposits are in the vicinity of Casper, Natrona County, and they are now being thoroughly developed by the McConnell Asbestos Co., of Pittsburg, Pa. A number of other asbestos properties are being developed by various persons in this same general neighborhood.

In California asbestos mining during 1901 was confined to the deposits in Riverside County, operated by the Pacific Asbestos Co. An asbestos prospect has been developed between Greenwood and Georgetown, El Dorado

*"Mineral Resources of the United States."

County; also in Calaveras County, in the vicinity of Copperopolis, the Elva asbestos mine has been developed to a limited extent. Chrysotile asbestos has been mined to a limited extent by the Berkshire Talc Mfg. Co. in the town of Hinsdale, Berkshire County, Mass. Chrysotile asbestos is reported also as having been found in the Upper Apple Gate district, near Grants Pass, Oregon, near the Oregon-California boundary; in the Enchanted Lake region west of Sims Station and near the line between Trinity and Shasta Counties, California; and near North Wilkesboro, Wilkes County, North Carolina. Both kinds of asbestos are used where non-conductivity of heat is the important factor, but it is the chrysotile variety that is used in the manufacture of cloth, rope, felt, buckets, tubs, washers, and so on. The production of asbestos in the United States during 1901 amounted to 747 short tons valued at $13,498, as compared with 1,054 tons, valued at $16,310, in 1900, and 681 tons, valued at $11,740, in 1899. The imports of asbestos in 1901 were valued at $691,828, as compared with $355,951 in 1900. The Canadian asbestos product in 1901 was valued at $1,186,434, as against $763,431 in 1900.

JOSEPH HYDE PRATT.

THE FOUNDER OF AMERICAN ARCHITECTURAL DECORATION.

AMONG the designers and executors of architectural sculpture no name is better known or more highly respected in America than that of the firm of Ellin, Kitson & Company. For years this concern, under the slight change which the firm has made in its name, has been identified with much of the most elaborate and artistic stone carving that has gone into great public and private buildings in this part of the country. Aside from actual productions from its studios, the company has always exercised a wholesome and stimulating effect on architectural decoration. In addition to stone carving and modelling the firm has turned out much admirable wood carving, and this branch of its work is made the subject of an interesting sketch in the New York *Tirbune*, which we take the liberty of reproducing.

American wood carving as an art began with the advent in this city of Mr. Robert Ellin, an English wood carver, says the writer. Before him, carving had certainly been done here, but it was Mr. Ellin who first gathered up a corps of workmen, each an artist, trained them, kept them together and made his shop a school of art and a center of art life. He was no mere carver and craftsman. He was able, on one hand, to divine the suggestions of the architect, and, on the other, to put his hand on the best man to carry them out. He was an organizer and a teacher. The carving and modelling done in his shop embodies the history of our architectural decoration from his arrival in 1867 until the present date. He has formed a generation of architectural carvers. Eminent sculptors like Bitter, who found his way to the shop before he could speak a word of English have worked in his ateliers. In the words of Mr. George B. Post, "To Mr. Ellin's breadth of view, his ability to attract men and to help them to do their best under his guid-

ance we owe the creation of our first great establishment for the production of plastic embellishments."

There was must enthusiasm in art for art's sake in those days. Men did work for the love of it, as, for example, when Mr. Kitson, Mr. Ellin's partner, was induced by Mr. J. Cleveland Cady to spend a vacation in carving into grotesques the capitals of a little English Gothic country church, way up the Hudson. John William Kitson, Mr. Ellin's partner and a brother of Samuel and Henry H. Kitson, noted sculptors, of Boston, was a pupil of his senior before coming to this country.

Mr. Robert Ellin was born in an English village, and drifted to Cambridge, England, where he entered the employment of Rattee & Kett, who, discovering his talent for wood carving, placed him in that branch of their business. In England Mr. Ellin drank in the art of carving from contact with the splendid examples of English Gothic, in which it is so rich. He emigrated to America just in time to help in the development of our best Gothic architecture.

In 1867 Mr. Ellin and Mr. James Whitehouse were commissioned by Andrew H. Green to execute the large panels beside the steps at the Mall, Central Park.

After some preliminary experience Mr. Ellin undertook his own business in 1871, and in 1872 made the carvings for the house of W. E. Dodge (J. C. Cady, architect), supplying the original artistic detail, as is usual in artistic embellishment. This beautiful work was done in what was known as "naturalistic treatment of Gothic," and is a marvel of delicate fancy. Sprays of lilies, birds and animals, exquisite suggestions of nature, nestle among the Gothic symbols in the capitals of the pillars and wherever decorative emphasis may be laid upon the lines of architectural construction. Then followed the residence of James A. Roosevelt—a fine example, for that day, of Renaissance—by Russell Sturgis, the architect and well known critic. Mr. Ellin executed the interior carving.

Then followed St. Thomas's Church, by R. M. Upjohn, Sr., and William Wheeler Smith, architect, and business flowed in so fast that Mr. Ellin felt justified in his attempt to found an art establishment in America which should be able to design, model and execute all varieties of plastic decorative art. It took six years of hard struggle to clear the first $6,000 earned by the little band of enthusiasts he had collected; but his art has been a reality in America ever since, and Mr. Ellin has lived to find himself the father of our natural wood carving, now thoroughly rooted throughout the country. Much of the finest work done by Ellin & Kitson has been in the magnificent group of private residences which have been the nucleus of our American art life—the homes of the Vanderbilts, Astors, Goelets and their companions. Each of these houses has been the center of a new growth in our national art life, and many of them are gems of architecture and decoration which have no equals the world over. The architecture is in the style of Francis I. Such is the house of Mr. Cornelius Vanderbilt, modelled after the famed Chateau Blois, by George B. Post, architect, and the William K. Vanderbilt house (perhaps the most beautiful in the world) and the Ogden

Goelet house, at Newport—these two last are by R. M. Hunt, and are worthy monuments of a great architect and finished scholar. In Mr. Cornelius Vanderbilt's house, Ellin & Kitson executed the hall, staircase and library. They made models for and superintended the execution of the exterior carving, except the spandrels and figure panels of the portecochere, done by Bitter; in Mr. W. K. Vanderbilt's house they did the whole of the exterior modelling and carving and the hall, grand staircase and dining room complete, in Caen stone and American quartered oak; in the Goelet house they modelled and carved the hall and grand staircase.

The house built by Mr. Samuel Tilden, in Gramercy Park, is indebted to Ellin & Kitson for its carved hall, staircase and entrance and the finishings of its dining room—the latter in satinwood.

The style of Francis I, which is practically Italian Renaissance grafted upon French Gothic, offers opportunity for peculiarly happy effects in carving. The endless variety, life and originality of Gothic art show themselves in the wealth of ever changing detail in the rich embellishments, as the conventional amors and love ribbons of Louis XV and Louis XVI can never do.

Each of the famous group of houses built in this period of our metropolitan architecture was noble, rich and dignified, and it was in the work of modelling and carving their splendid detail that Mr. Ellin was able to assemble his artist workmen and place American modelling and wood carving on a firm basis. At one time 178 workmen in wood and stone were collected in his workrooms, every man an artist. These men scattered in the great business depression of 1893, and have carried their craftsmanship all over the United States. There are probably 178 men in 178 businesses to-day, planted all over the country, each of whom "built the Vanderbilt houses." The building of the Collis P. Huntington house, in 1892, from designs by George B. Post, to which Ellin & Kitson furnished the carved hall and staircase, brings New York architecture well within the present era of Italian and French Renaissance, culminating, at present, in the magnificent mansion now being erected by Senator Clark in Fifth avenue and Seventy-seventh street, upon which Ellin & Kitson are now engaged. This latter is in the style of Louis XIV, and if carried out as designed by the architects, Messrs. Lord, Hewlett & Hull, it will be a structure of which both New York and Senator Clark may well be proud. Among other famous works which have been done by Ellin & Kitson may be mentioned the new old South Church, Boston (Cummings & Sears, architects); the chapel of the Theological Seminary, in Twenty-first street (Charles C. Haight, architect); the Astor reredos in Trinity Church and the one in Trinity Chapel; that in Grace Church; the offices of the New York Mutual Life Insurance Building, in ornamental plaster and carved wood, and those offices of the Equitable Life Building, which are occupied by the company, in wood and plaster. Ellin & Kitson also made the models for the decorations of the offices of the Prudential Life Insurance Company, the Mills Building and the grand hall and staircase in The Breakers, Mr. Vanderbilt's Newport cottage.

When Mr. Ellin first went into business there were no art museums, and it was necessary to own the drawings and casts of foreign art works necessary for models and guides to the taste of one's artists. On his trips abroad Mr. Ellin was wont to collect such materials and place them in his workrooms, and as an example of the trend of taste it may be noted that a fine detail from the Arch of Titus, purchased over thirty years ago, lately found its first use in New York as a suggestion for the decorations of the Stock Exchange.

The phenomena consequent upon the interplay of various styles of art have been thoroughly worked out in the ateliers of Ellin & Kitson (now Ellin, Kitson & Co., Twenty-fifth street, North River); Swedes, Austrians, Russians, Italians, French, Swiss, Spanish, Scotch, English, Irish, German, Danish, Belgian and Holland art have met here, and exchanged their secrets and blended and refreshed their energies and prepared the way for the artistic renaissance of the century now just begun.

RIGIDITY OF MASONRY CONSTRUCTION AND THE DECAY OF STONE.

IT is no exaggeration to say that a decided sensation has been caused throughout the entire stone trade of England by the report made some time ago that the big base stones in the piers of the Cathedral at Truro, Cornwall, were fractured and that the safety of the entire edifice was threatened. The bases were of Bath stone, which has been regarded as a safe and durable stone for interior work, and as the Cathedral is a recent structure, the failure of the base to sustain the superincumbent load was regarded as a disaster of more than local moment. To replace the fractured base stones would make necessary the underpinning of the arcades of the Cathedral, a very expensive and perhaps dangerous proceeding. The investigation of experts show that there had been no general settlement of the edifice, which made the affair of the base stones the more remarkable.

Following close upon this news came the announcement that the new and magnificent municipal buildings in Glasgow, which had been erected at a cost of $2,500,000, were found to be suffering from a peculiar and extensive decay of the stone. This deterioration of the stone is far-reaching, even the costly carving and sculptured work being affected to an alarming degree. The stone is from the celebrated Bannockburn quarries, which have heretofore enjoyed an excellent reputation. It is true that the stone for this particular job came from a newly opened quarry, but it was specified that it should all lie for a year in the builders' yard in order to test its weathering qualities.

With the publication of these facts there naturally have been many surmises and theories to account for the failure of the stone in important modern undertakings of such magnitude. There are periodical alarms in Eng-

land over the reported disintegration of the stone in Westminster Abbey and of disastrous settlements, with consequent fractures and splintering of the stone work, in St. Paul's. But both of these buildings were erected centuries ago, and disintegration might naturally be looked for. In the case of St. Paul's Cathedral, too, it has been decided that much of the trouble is caused by extensive excavations for sewers and railroad tunnels within a short distance of the foundations, that have destroyed the stability of the sub-soil. But if new structures erected by careful builders after plans by eminent architects and engineers are to go to pieces after a few years, it would certainly mean a blow to stone construction, unless some plausible explanation could be given. It is manifestly impossible to build up any theories concerning the failure of the two buildings at a distance of thousands of miles and without exhaustive expert reports upon which to rely for data. It is possible, however, to examine some of the theories that have been put forth, and to see whether they will stand the test of general experience.

With regard to the fracture of the base stones at Truro it has been claimed that the prophecy was made at the time of the building of the Cathedral that the late J. L. Pearson had entirely miscalculated the weight and strain that would come upon the stone. At the first glance this would seem a reasonable theory. But Mr. Pearson was a thoroughly competent and careful architect not likely to stumble in so rudimentary a matter as this. Aside from this, if the weight and strain were miscalculated, it is not likely that the base stones alone would suffer. There would be apt to be a general subsidence and that would cause the fracturing and splintering of other members. It is said that nothing of this kind is found at Truro, and that the base stones are all that have been injured.

Sir Thomas Drew has made a careful examination at Truro Cathedral, as the result of which he makes an elaborate report to the building committee. His eminence as an engineer gives great weight to his opinion. Sir Thomas Drew's remarks as to modern engineering methods in regard to rigid and inelastic construction, the accuracy of jointing and laying stone, and the composition of modern mortars and cements, form a most important contribution to a subject that has received comparatively little attention. The result of his investigation and his very convincing report will doubtless lead to a more careful study of this feature of construction in this country, as well as in England. It is apparent that we have not yet thoroughly solved all of the problems that arise in the erection of sky scrapers. Mr. William Sooy Smith has recently sounded a note of warning with regard to the corrosion of steel in the skeleton construction we now use for all large buildings. Some study has been given to the swaying of tall buildings from the effect of wind, but it has been mostly with regard to the effect upon the steel framework. So Sir Thomas Drew's conclusions should awaken interest in the effect of wind pressure upon the rigid stone construction in these buildings. He gives an impressive illustration in the case of the total collapse of a church erected at a cost of thousands of pounds, from this cause. We have hundreds of gifted engineers who are studying all phases of structural steel work, but we need some one who will give careful and exhaustive at-

tention to modern stone work and masonry along the lines indicated in Sir Thomas Drew's report.

Owing to the great importance of the subject and the general interest of Sir Thomas Drew's report we reproduce the major part of it herewith.

I have carefully read the contract and specification as applying to the building of the piers, and the latter is in terms not different from what is generally accepted by modern authority in methods of building as prevailing at the present day, he says. Those methods have been developed and influenced by modern engineering constructive science of the nineteenth century, in rigid and inelastic construction and accuracy and fine jointing in laying stone and in the constituents and scientific preparation of mortars and cements. The modern practice is generally accepted as advanced in constructive perfection beyond that of preceding times. I cannot say that I personally accept this view unreservedly.

It is to be remembered that though many great stone-built churches have sprung up in England in modern times, there is none of them that so revives the Mediæval cathedral of the thirteenth century in its design as does Truro Cathedral—in the problems of mobile construction restrained by countervailing forces, of balance, counterpoise and thrusts which were the characteristic distinction of the building of the Mediæval architect. A feature of the ancient construction was the adaptation of bedding and jointing as a means to an end, that of seating and adjusting stones in weight-bearing piers, so as to distribute pressure through successive courses.

Thirty years ago attention of architects was awakened to the fact that rigidity of construction, adopted from the modern engineer, was not advance in science, where stone-laying survived as a craft, by an alarming disaster in the failure of the granite columns of the Holborn Viaduct at its opening on Nov. 9, 1869, and which created somewhat of a public panic. As it illustrates the far less important occurrence of some fractures at Truro in 1901, it is worth recalling. The first engineering and architectural opinion of the day was called on to investigate the unforeseen occurrence. The indisputable resulting verdict was as follows:

"Had the hexagonal piers been built in 13-inch courses, no undue stress would have been thrown on the exterior part of a single layer. Whether they had been built in mortar or in lead, the weight would have been fully distributed course after course, instead of being thrown on a few points under the angles of a monolith. It is not, therefore as an eyesore only, but an offence against structural rule, that we must hereafter carefully avoid the juxtaposition of stone courses of very unequal magnitude. The ancient builders were well aware of this important canon of their craft."

The lesson of that disaster has been forgotten or unremarked by modern masons. I am familiar with such failures of monolithic-bearing granite or marble shafts, which are a certain vulgar fashion and offence to structural instinct in churches known to me.

After prolonged study of the fractures it was plain to me that there was no difference in character of the fractures at Truro Cathedral from those familiar to me elsewhere in monolithic-built piers, where undue stress

was isolated on the bases. In this case the fractures started from the bottom of the piers, and not only indicated that they would be consistent only in connection with monolithic-built piers, but moreover pointed to some exceptional bedding in the bottom course.

The cause of disaster, obvious to me, arises from the modern specification as to mortar and bedding, observed with a precision which is quite unusual to my experience of less conscientious builders. In Mediæval pier building, which I have had considerable opportunity of studying, the constructive method would have been different, and to the ideas of some modern constructors comparatively rude and barbarous. Beds of piers in old work are usually laid in comparatively thick swimming beds of mortar, and the mortar is an unscientific mixing of lime and sand by rule-of-thumb, and none too good—not "too good mortar," as an old-fashioned mason would describe mortar suitable for restoration of coursing of bearing piers, which lends itself to a certain elasticity through all beds.

At Truro the mortar, according to modern specification, was to be theoretic perfection as a cohesive cement, using superior hydraulic lime, and with modern grinding, measuring and mixing, producing a scientific cement, such as Mediæval masons had not. Bed joints, according to our specification, are to be no more than a bare quarter of an inch thick of superior cement. The stones are to be bedded in it for their full superficies out to the face of the stone. The jointing, too, of the piers at Truro is, in modern acceptance, theoretically perfect. The perfectly truly wrought beds of the courses were worked into their seats until a ¼-inch joint became more like 3-16 inch. The several drums of the columns became so perfectly adhesive (as a glue joint in wood might be) that the pier becomes practically a monolithic one, with the attendant risk of undisturbed pressure all coming in this case on a single bed, and that under the plinth.

The nature of that bed differs essentially from the other beds. It is practically a ½-inch bed of asphalt intervening between the surfaces of a rubble masonry foundation pier, more or less irregularly composed and surface-leveled, and the smooth-faced wrought under-bed of the plinth course of the pier. For some reason at Truro the necessity of the provision of a damp course has been manifested to prevent moisture being drawn from the sub-soil. Accordingly, the usual modern specification provision of a layer of liquid-run asphalt comes in as a sort of matter of course.. It would not occur to the draughtsman of most modern specifications that there might be cases in which the damp-course layer of asphalt would be better omitted.

It may now be seen that asphalt, a different material in its setting action and hardening from the mortar joints in the rest of the pier, and more or less compressive and deflective over any irregularity of surfaces, was an unfortunate insertion at the bedding joint on which stress was concentrated. Under the whole circumstances it can now be seen that the accident is explicable. The tightening of the base stones unequally on their bearing surfaces is manifest, and the fractures starting from the base bed and running up through two superimposed thin layers of inflexible stone, 11⅞ inches and 9⅞ inches, respectively, seem bound to occur.

It is to be noted, further, as perhaps contributory—according to dates furnished me—that these piers were carried up with a certain modern energy and impatience under a certain modern contract, and the weights were perhaps rather soon imposed on the sub-structure;* but it impresses me more that the modern mortar was too prompt in its setting quality, and too thin to allow of the automatic adjustment that is afforded by a thick swimming bed of old mortar, permitting the stones to find their seats and distributing stress through successive courses.

A modern method somewhat favored of bedding wrought stones out to the face and pointing up the joints as the work rises was followed, and it is a practical method in ordinary circumstances with suitable mortar rightly handled. In this case, however, tight bedding under the weak spur-bases contributed to the fractures most manifestly.

The consideration now comes—What is best to be done? It will be advanced by some, no doubt with some apparent reason, that there has been no spreading of the first fractures; that the base stones have found their bearing, and are manifestly carrying the weight imposed, and might so remain. I would not take the responsibility of advising such inaction, and for the following considerations. Truro Cathedral is typically a construction of Gothic ingenuity of forces kept at rest by counterpoises and clever distribution of parts. There are few old cathedrals which do not exhibit some shifting of equilibrium in course of time from settlements, decay of buttresses or counterpoise weights or some structural alterations. In two cathedrals which are my charge there is probably not a thirteenth-century pier standing truly upright. It is not impossible that at some time or another some disturbance might affect true plumb in Truro Cathedral piers, and the least shift of pressure on fractured bases might mean disaster then.

There is also wind pressure to be reckoned with in such structures. An illustrative case is furnished lately within my own observation. A large church had been built to its full height. Its nave piers had monolithic polished shafts, manifestly upright and carrying their superstructure. Here, however, the motive tremor was supplied by an Atlantic hurricane, beating on the north flank of the nave. At the least tendency to a "rocking" pressure on the beds of the capitals and bases, the stones flushed at these points, and the immediate collapse of the whole church, which had cost some thousands of pounds, followed. It was not, in my opinion, required to ascribe catastrophe to an earthquake, as was locally done, but it should not be forgotten either that there are recorded cases in very late years of structural disturbances of old churches in England from slight shocks from which our islands are not exempt.

With regard to restoration Sir Thomas Drew suggests that the fractured tones should be taken out and replaced with sound stones. It involves no question as to Bath stone having been suitable for employment in the first instance if I recommend, for convenience and safety in an insertion, a harder stone, Portland (Whitbed) or Doulting, and that, for this occa-

*Capitals of piers were laid four months eleven days after bases were laid. Owing to the casing covering the bases there was no discovery of fractures until June 18, 1891, and no possibility of discovering when they occurred.

sion, the plinth and bases, now in two cases, should be wrought in one stone, 21 inches deep. The rubble foundation should be lowered to admit of a level "copestone," which in this case might be of strong concrete, 6 inches deep, which would be a seat for the renewed base, and also a damp course in itself.

The above covers in general terms the procedure I would specify, so far as study of the outside of the piers now instructs me. I should withhold opinion, properly, as to what courses above the bases should be disturbed and relaid in differing cases of different piers, and as to the nature and number of the beds to be renewed, and whether in mortar or sheet lead. These are details for consideration from day to day for consultation between the architect and his skilled practical masons, as the interior of the work is opened up and viewed.

My general impression is, that the magnitude of the occurrence of such fractures as these should not be overrated, nor should they cause anxiety. Such unlooked-for occurrences are incidents in carrying out many great building contracts which are not heard of, and are of no outside interest, and are set right, and are to the builders a vexation not an anxiety.

It may surprise some to learn that, in point of fact, the working architect has not any data from which he may lay down with professional assurance what weight to the square foot of surface any description of stone ought to bear, the writer adds in conclusion. Tables of crushing weights there are, experiments on small cubes of 1 inch, 1½ inch or 2-inch, which can only point to comparative strength as between one stone and another. Conclusions founded on them as to bearing weights on larger masses of stone must be empirical and misleading. Even in these inapplicable tables of the text-books for practical works, these "authorities" differ so widely that it is useless for an architect to consult them. According to one authority in a leading text-book, the safe weight on a superficial foot of Corsham stone should be no more than 4½ tons. According to another, based on the same tables of crushing weight, it might be 8½ tons. According to another, familiar to most architects for daily guidance, the limit should be 8 tons. When one sees how enormously these limits are exceeded in practical building in everyday work, and which stands, the value of such authority is discounted. Some tests made on stones from Truro for Mr. F. L. Pearson on stones of sufficient size are, perhaps, more practical and instructive for architects than any given before. They have been made by Kirkaldy, of London, and certified. Even Mr. Pearson's tests, the interesting table of which I forward, bring out various and puzzling results; but I think they might satisfy that good Corsham Down stone may be trusted in piers up to a crushing weight of 150 tons per superficial foot. Now, following mere authority, which lays down in one case that the safe weight should be one-twentieth of the crushing weight, and another, who puts it arbitrarily as one-tenth, and adopting the latter for the time, the safe weight would be 15 tons per foot. But, turning to the late Mr. Pearson's practice, I have obtained from a very capable architect of Bournemouth, Mr. Fred. Fogerty, an admirable analysis from actual measurement of the structure of Mr. Pear-

son's fine church of St. Stephen in that town. It shows that Mr. Pearson did not hesitate to tax his piers there up to 27 tons 18 cwt. to the superficial foot, and the report is that "there is not the least sign of fracture anywhere."

I have had also an independent computation made of the actual weight borne at Truro, such as has not been made before, by a surveyor selected for his experience and intelligence for such inquiry, Mr. W. H. Stephens, of Belfast. His return is that the actual estimable weight on the large piers at Truro is 156 tons 13 cwt., and on the smaller piers 130 tons 1 cwt. 1 qr. That gives on one greater and one less pier, as legs supporting a 27-foot 6-inch bay, a weight in aggregate of 286 tons 15 cwt. I cannot fairly assign a net working bearing surface to the pair of piers greater than 13 feet superficial, which would be equivalent to 22.4 tons per superficial foot, and would be about one-sixth to one-seventh of the crushing weight taken at 150 tons, instead of one-tenth, as laid down by arbitrary pronouncement of theory.

I confess that my confidence in the sufficiency of the piers at Truro rests more on my confidence in the constructional instinct and great experience of the late great architect, Mr. J. L. Pearson, than on abstract theories. I am confident that there are reasons enough for occurrence of fractures at Truro without touching any element of inherent weakness in the stone used, and they would have occurred all the same, I believe, if Portland or Doulting stone had been used.

The data required for any theoretic calculation of the bearing sufficiency of Corsham Down stone in the piers at Truro, and the weight to be borne, are now ascertained and simple. I should be interested, if the building committee should think it well, to justify confidence by obtaining opinion of more theoretic experts than I can pretend to give, and on case stated, for which I can supply the most reliable figures.

The above report has far more than a local interest. It will be found full of suggestion to all having to do with stone construction. The objection that little valuable information for the architect and the builder can be drawn from the usual crushing tests of cubes of stone two or three inches in size are well founded. But in this country, under the inspiration and direction of the Government, we have undertaken far more exhaustive tests of most of the leading stone used for structural purposes. These tests show not only the crushing strength of the stone, but its elasticity and compressibility and its resistance to shearing. After a series of comprehensive tests of this nature the ultimate strength of the stone is fairly well known.

The decay of the stone at Glasgow is an entirely different matter, and it will perhaps be even more difficult to find a satisfactory solution. The theory has been put forth that the life of the stone was destroyed by working it on machines instead of by hand in the old-fashioned way. The many opponents of machine work who would like to prove this side of the case have brought forward a number of arguments that hand-worked stone is always the best. They claim that even in the matter of concrete and road metal hand-cracked stone is much better than that which has gone through the crusher. We take the liberty of disputing this entire proposition and of declaring that modern practice can bring forward no legitimate objection on

these lines against machine work. There are architects who object to machine tooling on the ground of its mathematical precision and that it does not have the character of hand work. This is a matter of individual taste, and many people are willing to pay to gratify their personal idiosyncrasies. Machine work on sound stone does not affect the life of the stone if it is done with the ordinary intelligence that every artisan should have. It is possible to set a planer so that it will bite too deep into the stone and lift out a constant succession of chips instead of making the clean smooth cut that is normal to the machine. But exactly the same thing can be done, and in very rare instances is done, with the wood planer and yet no one would think of denouncing the latter machine for what was manifestly the fault of the operator. If the English planers are at all worthy of comparison with the American machines, and are used as intelligently, it can be taken for granted that they are not responsible for destroying the stone in an entire job of great importance. There is no need, however, of going further along this line. The falsity of any charge that the stone was ruined by machine work, is proved by the fact that the decay is even more noticeable in the elaborately carved and sculptured work than in the plain surfaces and the mouldings. Surely this was gotten out in the old fashioned way with mallet and chisel and the fault cannot be laid at the door of the machines. In commenting on the matter, attention is drawn to the severity of the Glasgow climate, but there is no reason why its effect should be shown in one building and not in another. The fault undoubtedly lies in the stone itself and not in the method of working or setting it, or in any outside cause.

When we have gone as far as this, we can go no further without an examination of the quarry and of the stone as it lies in its natural bed. The natural inference would be that the stone was not sufficiently seasoned before being put in place. The statement that it was allowed to stand in the builder's yard for one year may apply only to certain portions of the stone, especially as the object was said to be rather to test its durability than to season it. In this particular deposit there may have been a greater amount of sap than is usual and the stone may continue green when another would be thoroughly seasoned. The presence of sap or quarry water in a building exposed to such a climate as that of Glasgow would readily explain the most widespread and disastrous decay.

LIMESTONES, FLINTS AND GRAVELS OF GEORGIA.*

THE road-building materials of the Tertiary area of Georgia are limestone, buhrstone or flint, and gravel. In the vicinity of the coast, shell also have had a limited use in road surfacing.

The limestone of South Georgia outcrop at many points throughout the Coastal Plain. They are exposed most abundantly along the streams, in the vicinity of lime sinks, or lakes. They are also occasionally seen in the cuts of the various railroads traversing that part of the State. These limestones are usually soft and of a porous nature, though occasion-

*Roads and Road-Building Materials of Georgia.

ally they become quite compact and are partly crystalline. The softer varieties, in places, consist mainly of fragments of shells and a limited amount of sand cemented together by a calcareous matrix. This class of limestone has been used, to a considerable extent, for road and street surfacing, both in South Georgia and Florida, and it seems to give entire satisfaction. It really cements into a compact, hardened surface, comparatively free from dust. This material has been used in the last few years on some of the streets in the city of Macon, where it has given good results. The cheapness with which these limestones can be prepared and put in place on the roadbeds makes them the most valuable material of the Tertiary area for road surfacing. The hard limestones of South Georgia appear to have but little use, so far, in road construction. Nevertheless they are more or less widely distributed, and they seem to be fairly well adapted to that purpose.

Buhrstone or flint is quite abundant along the Georgia-Florida State line, and also at many points further north. It is usually of a porous nature, and has evidently originated from the silification of the limestone, with which it is frequently associated. These siliceous deposits sometimes occur, on more or less continuous layers, often three feet or more in thickness; but, as a general thing, they appear as bowlders or detached masses imbedded in the sands or clays. The buhrstone is quite brittle, and it could hardly be used alone to advantage for road surfacing, but, if mixed with the soft limestones, which often are found near by, it would probably make a fair road surface.

Gravel deposits are quite plentiful along the border of the Tertiary area, where they are often seen, in thick beds outcropping beneath the superficial layers of sand. The pebbles are all water-worn, and evidently mark the limit of an old shore line. They are often cemented by ferruginous, sandy clays, and make excellent material for road surfacing. Many exposures of these gravel deposits are to be seen in the vicinity of Augusta, Milledgeville, Macon and Columbus. They are also frequently found in small, local beds as far south as Bainbridge. These gravel deposits are well exposed, just across the Savannah river from Augusta, near the Port Royal and Augusta Railroad. At this point the gravel has been extensively worked for the last few years and shipped to Augusta and Savannah, where it is used for both street and road surfacing. The binding material of this gravel is a ferruginous, sandy clay, which readily hardens into a compact mass on being dampened and rolled, forming an excellent road surface which is both durable and free from dust.

S. W. McCallie.

Comment on Timely Topics

STONE VERSUS BRICK.

A NUMBER of the English trade papers have been reprinting an article that recently appeared in one of the organs of the brick industry in this country. This article is to the effect that brick has fast superseded stone as a building material in New York, and, inferentially, in all of the other American cities. It is declared that specifications for new buildings call for more brick now than formerly. It is intimated that stone has gone out of favor for skyscrapers since the fire in the Home Insurance Building a year or two ago. The article goes on to declare that stone is but little safer than wood in the matter of fire resistance.

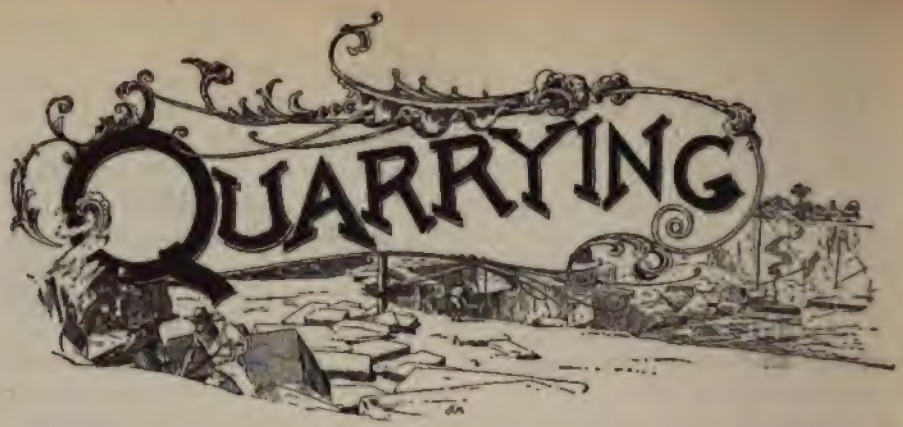
In this country we are used to specious arguments of this sort, put forth by those who have certain ends to gain. We do not call them wilfully untruthful, but we incline to the charitable view that the writer is looking through rose-colored spectacles. But when such articles are reprinted in a foreign country where the exact facts are not attainable, they create an extremely false impression. If the writer had confined himself to the statement that there was more brick building in New York now than ever before, and that while formerly skyscrapers were built almost invariably of stone, brick is now frequently used for the upper stories, he would have been within bounds of strict truth, although he would still create a wrong impression unless further explanation was given. There is more brick building in New York now than heretofore, simply because there has never been such a period of building activity in the entire history of the city. The use of brick is not increasing at the expense of stone, for the use of the latter material will show an even more marvelous advance.

Along the leading thoroughfares like Broadway stone and iron were the favored materials used by the former generation of builders, but if one looks at the countless blocks of business buildings, warehouses, etc., in the lower parts of the city he will see that almost every structure erected more than a dozen years is almost entirely of brick, the exceptions being a few iron buildings. If this same observer looks at one of these blocks rebuilt within the past ten years he will find many buildings put up in which the entire facing is of stone, and that even where brick has been employed for the upper stories stone is carried up above the second story, instead of merely to the water table as in the old buildings. In this way stone has steadily encroached on brick in the ordinary commercial structures.

We have intimated above that brick has been recently used to some extent in skyscrapers, but a little explanation shows that this does not mean much of a triumph for the brickmakers. When these immense buildings were first introduced they were much in the nature of an experiment, and none save the wealthiest corporations put them up. The matter of the initial cost was not vital, and, in order to obtain durability and the richest effect, stone was used almost entirely. When skyscrapers had proved their utility and popularity they multiplied rapidly in the lower part of the city. Where ordinary five or six-story brick buildings would have been erected a few years ago, a fifteen or twenty-story structure is now built, and the matter of cost becomes a leading factor. At first terra cotta was a favored material for the upper stories, but later brick was employed. It is safe to say that where brick is used it is almost wholly on the score of economy and not from choice. More stone skyscrapers are being erected than ever before, but inasmuch as these buildings are going up on every block, it is only natural that brick should be employed in many of them.

The same article from which quotation has been made dwells at some length on the fact that a banking house in the lower part of the city is about to erect a brick bank building. It would be strange if brick should not occasionally be used for this purpose. The argument that might be drawn from this instance loses its point when one remembers that within a stone's throw is now being erected a bank building of 22 stories entirely of granite, and that at least half a dozen other buildings for a like purpose are now being constructed of granite, limestone or marble.

With regard to the silly charges concerning the lack of fire protection afforded by stone construction it is needless to reply. It may not be out of place, however, to state that the one building which came out in the best condition from the terrible Paterson fire was a stone structure, the material for which was quarried but a few miles from that city. The entire article would be worthy of little attention were it not for the wide currency it has had in the foreign newspapers, and from the fact it is only one of a series of similar misleading and false statements put forth by the organs of the brick and clay industries.



Steady progress is reported at the Osgood Marble Quarry, near Marble, Gunnison County, Col. The channeler has passed through forty feet of broken marble and has now reached solid stone. Superintendent F. H. Eaton declares that he is now ready to quarry blocks of white marble, weighing about 8 to 10 tons apiece. A few seams are still found, but it is confidently expected that these will disappear when the next floor or two has been taken off.

The largest derrick ever erected in Maine is being put in one of the Stonington quarries. It will be capable of lifting seventy-five tons. The derrick fittings alone weigh ten tons.

Mr. Dodd, of Zanesville, O., declares that he has discovered a fine vein of onyx just outside of the corporate limits of La Follette, Tenn. He expects to erect a marble and onyx mill.

A stone quarry covering 135 acres is to be developed at Herminie, Westmoreland County, Pa.

Several hundred men are not at work in the Guilford Granite Quarries getting out stone for the new Baltimore Custom House. A railroad two miles long, being an extension of the Savage branch of the Baltimore and Ohio to Guilford, has just been completed. This will be used in shipping the stone to Baltimore.

Edson Bros., who are operating extensive quarries at Waterloo, N. Y., will establish a stone crushing plant costing about $15,000. Messrs. Edison have a contract to supply the Lehigh Railroad with 500 cars of crushed stone daily. A siding is now being constructed from the Lehigh tracks into the quarry.

The quarries at Dickersons, Montgomery County, Md., which have been idle all winter, have again started operation and are crushing ten carloads of stone a day.

The crusher and boiler house of the Schwind Quarry Company, Edmondson avenue, Baltimore, were burned to the ground recently. The big stone crusher and the hoisting engine were practically ruined. The fire engines had scarcely left when workmen began clearing the ground for rebuilding.

The Southern Commercial Company has been incorporated in Milwaukee with a capital stock of $400,000 to deal in quarries and mines. The incorporators are George L. Alexander, Herman Pormling, Charles Brussett, August Paulsen and Joseph Lers.

The St. Cloud, Minn., Granite Works will at once open up the Atwood-Beebee quarry, which it recently purchased. The quarry covers twenty acres.

The firm of Heagan & Grove, who have been running the Dodlin granite quarry, at South Norridgewock, Me., on a lease for the past year, have been compelled to suspend payment. About sixty men were employed. It is reported that a syndicate will build a spur track of the Somerset Railway to the quarries, and will operate them extensively.

George De Luca has purchased George Ballentine's quarry at Gladstone, N. J.

Mr. Mann, of Baltimore, has opened a quarry on the marble land at Alford, Mass., which he recently bought from William Mulligan. Mr. Mann is endeavoring to organize a company to operate the quarry.

John M. Mallon, of Denver, and a number of men of Laguna, New Mexico, have incorporated the New Mexico Pumice Stone Company, with headquarters at Albuquerque, and a capital of $150,000. The company will work pumice stone deposits near Laguna.

The Pope Cement and Brick Company, of Pittsburg, Charles E. Pope, president,

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has purchased from A. J. Morris, the extensive bluestone quarries located near Dunbar, Pa. The company will install a big stone crushing plant, capable of turning out six hundred tons of crushed stone a day.

The firm of Olds & Miller, which has conducted the Charlotte Valley Bluestone Quarry at West Davenport, near Oneonta, N. Y., has been dissolved, and Mr. Olds will continue the business alone.

A number of capitalists from East Tennessee are endeavoring to secure the large marble beds a few miles from Tullahoma, Tenn. If they are successful a company will be formed with large capital to work them. The marble beds have been exploited at different times heretofore, but owing to the difficulty of transportation the stone has never come into use. There is red, green, gray and pink and white variegated marble in great abundance.

The presence of mind of a woman saved thirty men employed in the quarries at West Conshohocken, Pa., from a terrible accident recently. Miss Henderson, who lives a short distance from the quarry, was looking from her window when she saw the roof of the powder magazine was blazing. She ran to the quarries and warned the men. While all were fleeing for their lives a serious explosion took place. The air was filled with splinters, stones and dirt which showered down upon their heads. Owing to the timely warning that was given, the workmen escaped serious injury.

A large blast was recently successfully fired in the city quarry at Janesville, Wis. The stone crushing plant at the quarry is one of the most complete in the West. Eighteen men are now employed.

A number of Nebraska capitalists, including Dr. F. W. Tucker, Lincoln; Judge E. W. Tucker, E. A. Tucker and Rudolph Veteska, Humboldt, and Paul Kittrick, of Nebraska City, have purchased a valuable quarry near Riverside, Cal., from the Dyer estate, and expect to develop it immediately.

The Cyr Brothers, of Hartland, Me., have recently opened a new quarry on the line of the Sebasticook and Moosehead Railroad, within half a mile of "Devil's Head" in Harmony. The granite is of gray color and of exceptional quality. Blocks twenty feet long and of any required width can be taken out. Besides the gray granite there is on this mountain an abundance of pink or red stone as well as granite with a greenish cast.

About seventy men are now employed at the Klondike quarries at Uiantic, R. I. These quarries were opened only five years ago. At that time they were owned by Frank E. Bliven, a stone cutter. The thirty acres of ground were used for farming, and when Mr. Bliven discovered a fine ledge of the blue Westerly granite he did not have the capital to develop it. He then sold it to James Gourlay, manager of the Rhode Island Granite Works, who in turn leased the property to this firm. This company conducted the business until the first of the present year, when Mr. Gourlay purchased their interests and placed Charles W. Austin, for many years manager of the Red Stone Quarry, in charge of the work. The popularity of the stone is shown by the fact that although the quarry has been worked only five years the opening is now 250 feet wide by 300 feet long and 100 feet deep.

The contract for the superstructure of the new Westmoreland County Court House at Greensburg, Pa., has been awarded to the Lindsey Construction Company of Pittsburg. It is to be built of Troy, Pa., granite, and the bid was $570,378. The Troy granite quarries were opened only six years ago, and this is the most extensive job in which the stone has ever been employed.

Stone Ballasting Instead of Trestles.

The Great Northern Railway will double track its coast line between Seattle and Everett. Instead of using trestle work as in the past, the only material to be employed will be stone. The company is improving its terminal facilities in Seattle, and henceforth every change that it makes will be in the line of the greatest permanency. In places one of the tracks will be laid in the edge of the water on a stone foundation. All other points along the line the engineers have planned to move the present track in and lay the new one in the general position now occupied by the old rails. In pdaces where slides have occurred both tracks will be laid on stone work in the edge of the water. Wherever practicable cuts will be made on heavy stone work across small arms and inlets.

The main idea of the company is not so much to avoid the danger of slides, though that subject has received serious attention in the past, and will be one of the objects accomplished by the changes contemplated, but to straighten and align the tracks to avoid curves as much as possible. This will permit trains to make a great deal faster time between Seattle and Everett than they have been able to do in the past.

Marble and Granite

McHugh Brothers, marble dealers, of Glens Falls, N. Y., have dissolved partnership. The business will be continued by James H. McHugh.

R. L. Alden, of Montrose, Pa., will establish a marble and granite works at Deposit, N. Y.

Oscar E. Owen, who has conducted a marble business on Mulberry street, Middletown, N. Y., for a number of years past, has sold out to W. F. Benedict & Son of Wurtsboro.

For some time past there has been litigation involving the sum of $225,000 between the U. S. Marble Company and the Colonial Marble Company, W. V. Garrett and C. H. Williams of Spokane, Wash. The U. S. Marble Company brought suit for $100,000 against the Colonial Marble Company, W. V. Garrett and C. H. Williams, of the firm of Garrett & Williams. The plaintiffs claim that the Colonial Marble Company, through its officers and brokers, Garrett & Williams, had issued a prospectus containing pictures of the workings of the U. S. Marble Company. Furthermore they claim that the Colonial Company was using newspaper articles which had been written, not about their company, but about the U. S. Company. They asked an injunction to restrain the defendants from further use of this material. The Colonial Company responded with a suit for damages for $50,000, and later Garrett & Williams followed with a suit for $75,000, claiming libel. The fight promised to be very bitter for a time, but now wiser counsels have prevailed, an agreement has been reached, and all of the suits have been withdrawn.

Mr. Charles Coble has purchased the Keystone Marble Works at Elizabethtown, Pa., from his father, Mr. Jacob Coble.

Stephens & Gerrard have built a new stone cutting shed just off Blackwell street at North Barre, Vt. The cutting shed is 72 x 36 feet and the stock room is about half as large. A 25 h.-p. air compressor has been installed which will run 28 pneumatic tools. A 15-ton turning crane has been erected.

Charles E. Ryle has purchased the interest of his partner, John H. Crimmins, in the Columbia Granite Co., at Montpelier, Vt. Mr. Crimmins was compelled to retire on account of ill health.

Jacob Benz, of Belvidere, N. J., has opened a granite and marble shop at Newton, N. J.

The Denver Marble & Onyx Co., with $10,000 capital stock, has been incorporated by George R. Markey, Clyde Turnbull and Bret Harris.

The White Crystal Marble Co., of Gouverneur, has been incorporated with a capital stock of $75,000. The people who are interested are: Charles A. Lux, of Clyde, and Edward Morrison and D. C. Whitney, of Gouverneur. This new company will develop the Morrison & Whitney quarry, which consists of about sixty acres near Gouverneur. The plant will be greatly enlarged at once. New machinery, including two more gangs, is being installed. The company will give employment to about 50 men. A number of orders are already in hand, including one for $60,000 worth of marble for the residence of Mr. Horton, a millionaire at Middletown, N. Y.

Hamer J. Higgins, for forty years in the marble business at Bloomington, Ill., is dead at the age of 62 years.

Reports from most of the granite centers indicate a busy and prosperous summer. Nearly all of the quarries in Maine, Vermont, New Hampshire and Rhode Island, and at Milford, Mass., are working to their full capacity and new men are continually being taken on. Owing to the strike at Quincy, business received something of a setback. The trouble with the men at this place has been settled on the following terms: This year the men work eight hours a day for seven months and nine hours for the other five months. In 1903 they work eight hours for nine months and nine hours for three months; in 1904 it is eight hours for ten months and nine hours for two months. The pay is to be the same for eight hours as it was for nine, previous to the strike. If the Barre quarrymen get an 8-hour day before 1905 the same is to be granted to the Quincy quarrymen.

The Alabama Marble Co., of Mobile, has recently been incorporated under the laws of Alabama to work extensive quarries in Clarke County. Mr. J. H. Hobson is president of the new concern. He has come north to purchase an extensive outfit of machinery.

The Maine Red Beach Granite Co. has recently installed a big hoisting crane, replacing the one in use, which had become

too small to handle the heavy columns of granite which are received at the polishing works.

L. E. Luke and J. K. Cotton have opened a monumental establishment, known as the Elizabeth City Marble Works, at 519 Poindexter street, Elizabeth City, N. C.

E. P. Triplett has opened the Avondale Marble Works, at Avondale, near Birmingham, Ala.

Francis Wiggin, of Portland, is preparing an extensive article on the granite industry of Maine for the Labor Commissioner of the State.

C. E. Tayntor & Co. are making extensive improvements at their Hallowell plant. A 50-ft. addition is being built to the cutting sheds, which will make the complete structure 200 x 25 feet. A new blacksmith shop has also been erected.

William N. McQueen, a well-known granite manufacturer, who has been in business at Barre for the past ten years, is dead at the age of 48.

The Talmani Mosaic & Marble Co. has been formed in Cleveland with offices in the Chamber of Commerce building and works at 121 Chestnut street. Ernest Talmani is general manager.

The Hudson & Chester Granite Co. is building a 15-foot addition to their polishing shed at Chester, Mass. Another shed will also be built.

The Lake George Marble Co. has begun the construction of a mill at their quarries in Warrensburg, N. Y. It will be 52 x 52, and 18-ft. high.

The stock in the marble yard of William Daugherty, of Sunbury, Pa., has been sold by the Sheriff for $1,266.

The Higgins-Jung-Kleinau Co., of Bloomington, Ill., has been incorporated to deal in and manufacture stone, granite and marble; capital, $35,000; incorporators, F. B. Higgins, J. P. Jung and C. A. Kleinau.

John Burke, of Waterbury, Vt., has entered into partnership with John K. Starr in the granite business at South Rygate. The new company will be known as the Starr-Burke Granite Co.

The Pioneer Marble & Granite Co., of El Paso, Tex., has been incorporated, with a capital stock of $10,000, by William Caples, Michael Rotinnio and W. N. Caldwell.

A New Granite Company in the South.

J. T. Wyatt & Co., granite contractors of Salisbury, N. C., are opening up several new quarries near that city. The quarries produce gray and rose colored granite of high grade. Messrs. Wyatt are starting in with experienced union help, a number of the men having come from Pacolet, S. C. The quarries are situated alongside the Southern Railroad tracks and are very accessible. One plant, including derricks capable of handling large sized blocks and a cutting shed, have been installed and other quarries will be equipped later. The company has options on 900 acres, in addition to the property which it owns outright. All of this is underlaid with high grade granite covering an area of about three miles in length. Although the stone has been in the market but a short time it has met with high favor. Mr. G. W. Watt, the millionaire of Durham, N. C., built his new mansion of the stone and demands are coming from all over the South.

A Forty-one Ton Monolith.

The first of the eight large stone pillars that are to adorn the front on Chambers street side of the new Hall of Records was placed in position recently. The monolith is 36 ft. long, 4 ft. 2 in. in diameter and weighs 41 tons.

The stone was brought here from Hallowell, Me., where it had to be trucked two miles to the railroad, put on a freight car, run to the Harlem River, transferred to a lighter and taken to pier "A." Here there was a delay of 24 hours in deciding whether the pier would stand the heavy weight. The monolith was finally landed successfully and was hauled to Chambers street by a score of horses. Every manhole on the way that the load passed over was cracked by its enormous weight. Two other attempts have been made to get the stone into position. Two engines, two booms, one of steel, and a double derrick had to be used to swing it on to its granite base.

An Immense Block of Granite.

One of the largest blocks of stone taken through a city was recently delivered at Paterson, N. J., from the Erie Railroad. It was a block of Barre granite, 34 feet long and weighed 43 tons. It is to be used in sealing the mausoleum over the remains of the late Vice-President Garret A. Hobart. It was loaded on a truck and driven by twenty-two teams of horses to Cedar Lawn Cemetery. In its passage through the streets it crushed through a manhole and tore up crosswalks and large sections of the macadam pavements. The weight of the stone sank the big wheels of the truck into the pavement so that the dray had to be jacked up often before further progress could be made.

Limestone and Sandstone

There is a great boon in the bluestone industry in the neighborhood of Walton, N. Y. During the general season of business depression some years ago, quarrying operations were almost entirely suspended in this district and now the industry is on a firmer basis than ever before. The leading firm in this territory is Shaw & Lupton, who have opened a very promising quarry on the Townsend property. This produces what is said to be the finest flagging ever found in this section. The bed is only about five feet thick, but the stone is of excellent quality and quarries easily. Five men are now at work in the quarry under the direction of William Lockwood. Mr. Day, a son-in-law of Mr. Shaw, of this firm, has opened a quarry close at hand. The Henry Wager quarry has been sold to a Mr. Smith, of Roscoe, who will operate it to its full capacity. Lockwood & Utter have leased a new quarry on the Ogden farm and Wilbur Lockwood has leased one on the Townsend farm. William Lockwood has also opened a quarry on the Carroll farm near Pinesville. William Cairns is operating on Mt. Holley and Ralph Cairn is operating the old Terry & Robertson quarry. These two operators will market a large amount of flagging, curbing and building stone. S. A. Kinch and C. D. Hallenbeck have opened a quarry on the farm of the latter near Weed's Bridge. It has a bed of 10 or 12 feet with only 5 feet of top. It is reported that the old H. E. St. John quarry at Marvin Hollow will be rented to parties who will operate it to its full capacity. This quarry has probably produced more stone than any other in the entire territory.

Jacob R. Milliard has purchased about 120 acres of limestone land adjoining his extensive stone quarry in North Annville Township, Pa. The purchase price was about $10,000. Mr. Milliard will open new quarries on this land. Mr. Milliard now owns a chain of quarries several miles long between Annville and Palmyra and has others near Meyerstown.

The Annville, Pa., Stone Company has contracted with Thomas J. Humphries for the stripping of its limestone deposits near Palmyra.

The Lackawanna Iron & Steel Company, which is operating quarries for fluxing stone at West Lebanon, will open several new and extensive quarries between its furnaces and West Lebanon.

The Medina Quarry Company has opened handsome new offices in the Harrington block at Albion. Several of the quarries are already working a large number of men. There is a full force in the De Graff quarry and over 80 men are at work in the Brady quarry. The Reed & Allan quarry will be worked by its former owners, as well as the Fancher & De Lancey quarry. Filkins & Gorman have a large order on hand and are working a full force. When E. F. Fancher, of Albion, sold his quarry to the syndicate, he turned over to them orders he had booked for about $100,000 worth of work. The syndicate proposes to install the most improved machinery, so that the cost of quarrying stone will be materially lessened.

Savage & Scofield, contractors of Olympia, Washington, have sold the property known as the Port Orchard Stone Quarry to the Puget Sound Bridge Co., of Seattle. The price paid for the property was $39,000. The Port Orchard quarry is considered one of the best in the Northwest.

A Curious Geological Formation.

China is commonly supposed to be so densely inhabited that much further increase in population cannot be supported, since the soil is now made to yield its utmost and has been so doing for perhaps hundreds of years. This hypothesis is more or less correct in some localities, and were it not for the peculiar geological formation or deposit known to geologists under the name of "löss," that covers great areas in Kan-su, Shensi, and Chili, a great part of these provinces would have long since been added to the deserts of Mongolia.

The löss formation may be described as a fine-grained, homogeneous calcareous and sandy loam, penetrated vertically by root-like pores or tubes, which have the effect of producing vertical cleavage in the formation. When intersected by streams, this deposit readily develops into bluffs and cliffs. It usually contains land shells and sometimes the bones of land animals; fresh water shells are rare, while marine organisms are entirely absent. In

Northern China this remarkable accumulation covers vast areas and attains, in places, a thickness of from 1,500 to 2,000 feet. Richthofen believes this peculiar deposit to have been gradually accumulated by the winds flowing outward from the desiccated regions of Central Asia. Vast quantities of fine sand and dust are there swept up during storms and scattered far and wide over the adjoining territories, which are thus ever and anon receiving increments to their soil. Such finely sifted material is highly fertile and favors the growth of grass; every fresh deposit of dust tends to become fixed by reason of the grass, and the formation is thus gradually increased in thickness. It is this continual growth of vegetation, keeping pace, as it were, with periodical accretions of soil, that probably produces the porous capillary structure above referred to as the cause of the vertical cleavage of the löss.

Löss occurs in many other countries, but nowhere does it attain such enormous development as in China. In Europe it is met with in the valley of the Rhine and the low ground traversed by the Danube. In America it is found in the Mississippi valley, covering quite extensive areas.

In China the löss comprises a large portion of the "Great Plain," and is somewhat developed on the Yangtse above Nanking and a little on the Han River. It spreads all over the northern provinces where it has not been eroded away. In Shensi it spreads equally over tablelands 6,000 feet high and valleys several thousand feet less in altitude. The southern bank of the Yellow River consists entirely of löss. A peculiar feature of the formation is that it spreads alike over places which differ much in altitude, fills gaps between hills, smoothes away the uneven surfaces of mountainous districts and creates conditions for agricultural prosperity which would not exist without it.—F. Lynwood Garrison, in "Cassier's Magazine."

Mineral Curiosities in New South Wales.

In New South Wales, near Wingen, a singular natural curiosity is observable. This is an object popularly known as the Stone Woman of Wingen, says a writer in the "St. James's Gazette." The spur of a mountain range known as Salisbury Crag terminates in a bold bluff headland, about 700 feet above the level of the valley which it commands, the profile assuming the form of a graystone woman of enormous dimensions, sitting with her back against the cliff, her head separated from the top and her feet hidden among the trees which grow up to the bottom of the cliff. On her knee there is resting an open book, which she is not reading, but instead is gazing forever with a steadfast, unchanging look down the beautiful valley of the Hunter. From where the feet of the stone woman rest among the towering trees that grow around the base of Salisbury Crag to the summit of her head must be about 500 feet, so that if she were to stand up straight some day she would be about 800 feet high. If the proper point of view be chosen the pose of the figure is perfect in its magnificent simplicity.

At Wingen also is to be seen the only burning mountain to be found in Australia, and the only one not of volcanic origin known. The summit is 1,820 feet above sea level, and it is easily reached from the township. It is supposed to be an immense coal seam, which has in some unaccountable way become ignited, and has been burning ever since. When first discovered, during the early days of settlement, the aboriginals of the district explained, in their own rude fashion, that the mountain had been burning in the days of their forefathers; that, as far back as they could remember there had always been the big smoke. The course of the fire can be traced a considerable distance by the transverse rents or chasms occasioned by the falling in of the ground, from under which the coal had been consumed. From year's end to year's end fumes of smoke are continually issuing from the sides of the mountains, the surface of which is in many places covered with a sulphurous deposit. In the vicinity of the openings from which the bluish rings of smoke issue the ground is hot to the touch, the vegetation with which it was originally covered having disappeared, and sticks thrust into the ground speedily become charred, if not ignited.

A Stone Breakwater Proposed.

Every spring and fall the storms and high tides play havoc with Coney Island. The ocean has gradually encroached on the beach, and not content with sweeping away the Concourse and the park lands, has even wrecked expensive buildings. Park Commissioner Young proposes to build a stone wall a short distance below the water-mark. If this breakwater should be built, and if it should fulfill the purpose intended, it would allow the reconstruction of the Concourse and preserve an attractive beach that otherwise will entirely disappear within a few years.

Stone Trade Notes

The city of Milwaukee will hereafter require that all crushed stone shall be delivered in wooden boxes which are to be numbered and inspected by a city official, each box to have a stated capacity. It has been the custom for contractors to deliver stone in dump wagons at so much a load without much attention being paid to measure.

The Foster & Herbert Cut Stone Company is a new enterprise at Nashville, Tenn. The company has a well equipped yard with pneumatic tools and will do both monumental and building work.

The Valley City Stone & Gravel Company of Grand Rapids, Mich., has been incorporated, with a capital stock of $20,000, to work stone and gravel deposits near Grandville, Mich. Interested in the new company are Dr. C. M. Kelly of Grand Rapids, C. F. Nye, W. F. Sendall of Belding, and D. F. Elkerton of Nome, Alaska.

The oil stone factory at Manlius, N. Y., recently vacated by the Pike Manufacturing Company, will be reopened this summer by the old Labrador Oil Stone Company, which formerly manufactured whetstones there. Stone will be brought from Hot Springs, Ark.

The Consolidated Stone Company has been incorporated under the laws of New Jersey, with principal office at 1 Montgomery street, Jersey City, to deal in stone, etc. Capital, $600,000. Incorporators: J. H. Davis, John B. Conkling, James A. De Groat, C. J. Curtin and Albert Schmid.

The White Clay Creek Supply Company, with a capital stock of $125,000, has been incorporated under the laws of Delaware to acquire mines, quarries and mining rights and to develop same. The incorporators are from Trenton, N. J.

The Builders' Sand & Gravel Company of Davenport, Iowa, has increased its capital stock from $15,000 to $20,000.

The Century Stone & Manufacturing Company of Johnstown, Pa., has been incorporated with a capital stock of $100,000.

E. C. Thym, of Carthage, Mo., has organized the Thym Cut Stone Company with a capital stock of $10,000. Mr. Thym will be superintendent and manager. There will be a branch office at Kansas City.

Newton B. Smalley has purchased the interest of his brother, A. I. Smalley, in the Plainfield Stone Company at Plainfield, N. J. The retiring partner will devote his time to general road contracting.

The Coxey Silica Sand Company of Mt. Vernon, Ohio, has been incorporated under the laws of New Jersey with a capital stock of $500,000.

The Standard Stone Company of New York has been incorporated under the laws of Delaware to quarry for granite, marble, etc. Capital, $100,000.

The plant of the Housatonic River Trap Rock Company at Derby, Conn., which has been idle for more than a year, is to be reopened and thoroughly overhauled. New crushers will be installed and modern machinery added.

Philip Haas has begun the manufacture of artificial stone at Miami, Fla.

Fred. H. Smith, proprietor of monumental works at Norwalk, Ohio, has opened a cut stone yard for building work.

A corporation composed of Philadelphia and Pittsburg capitalists with a capital stock of $900,000 has purchased all of the sand manufacturing plants at Mapleton, Pa. The new company takes over the Juniata Sand Company, Macklin & Stevenson, C. P. Dull, Mapleton Sand Company, Keystone Sand Company, the Columbia Sand Company and also a concern at Hancock Md.

Skilled granite cutters are wanted at St. Paul, St. Cloud and Rockville, Minn.; Amberg, Wis.; Rion, S. C., and Morrisville, Vt.

The McLeod Stone Company of Minneapolis will build a stone crushing plant at Polk street and 16th avenue, northeast. It will cost $10,000 and will be 100x100 feet, and two and a half stories in height.

James E. Bennett has been appointed temporary receiver of the Keystone Marble & Slate Company, 635 W. 47th street. The company has been in liquidation for some months.

Peter Cornelius Sonius, who has conducted a steam marble mill for fifteen years past at 400 East 37th street, has filed a petition in bankruptcy, with liabilities at $5,183 and assets $1,896.

William Bradley has been appointed receiver of the International Kaolin Company, which was organized in 1900 with a capital stock of $1,000,000 to manufacture kaolin in Florida.

It has been decided to discontinue the cutting of granite at Portsmouth, N. H., for the new dry dock being constructed there. Hereafter the stone will all be cut at the Maine quarries.

It is announced that the price of crushed granite in Chicago will be advanced from $1.75 to $2.00 a yard as the result of the recent consolidation of the granite companies in Wisconsin which supply most of the material. That this is the result of natural conditions instead of merely the arbitrary act of a trust is shown by the fact that the crushed stone business in that territory has been on a very unsatisfactory basis for some time past.

The V. J. Heddin & Sons Company has been incorporated at Newark, N. Y., with an authorized capital of $500,000, of which $300,000 is common and $200,000 preferred stock. Six per cent. is to be paid on the latter before the common stock shares in the earnings. The firm of V. J. Heddin & Sons built the Produce Exchange Building in New York and the magnificent new buildings of the Prudential Insurance Company in Newark.

The A. Leschen & Sons Rope Company, with main offices and warehouses at St. Louis, have issued a revised wire rope list. The many users of wire rope who have had this little booklet in the past, are aware of the great amount of useful information that it contains. There are figures giving the allowable working strain, the approximate breaking strain, the average weight of rope per foot, the minimum size of drums or sheaves, and the diameter of hemp rope of equal strength, for all of the different sizes of wire ropes. Aside from this the booklet is devoted to the different forms of hooks, sockets, shackles, clips, clamps, turnbuckles, blocks and sheaves, etc. The latter portion is devoted to the patent automatic wire rope tramways, which this firm manufactures and which have been used with great success all over the world. The specialty of the Messrs. Leschen is the patent flattened strand Hercules rope. The advantages claimed for this rope are its flexibility, its freedom from all tendency to spin or kink and its diminished wear in passing over sheaves and blocks. The book is full of useful suggestions as to splicing, lubricating, etc.

The condition in the labor field since last writing has been fairly satisfactory. The settlement of the trouble at Quincy seems to be on a fair basis to both sides. The most disquieting condition of affairs is in the Cape Ann region. The workmen demanded an advance of 2 cents an hour for quarrying and $2 a thousand for all of the paving cut. This was refused by the employers, and 700 men quit work. This included the blacksmiths and engineers, who went out on a sympathetic strike. The principal concerns affected are: The Rockport Granite Company, Cape Ann Granite Company, The Pigeon Hill Granite Company, Edwin Canney, William R. Cheeves and several smaller concerns. This, of course, tied up the quarries completely. Many of the men have left the district for Chelmsford, Milford, N. H.; Milford, Mass.; Quincy, and Middletown, Conn., where help is needed. Strikes of smaller proportion are noted in other localities. The employees of the lime and cement companies at Marble Head and Hamilton, Wis., demanded higher wages and when they were refused quit work. Feeling runs high, and threats of dynamiting the plants have been made. The workmen in William Moellering's quarry at Rich Valley, near Wabash, Ind., struck because they were refused an advance. Moellering is engaged in crushing stone for a big contract in Peru, Ind. He refused to make any concessions. A small strike took place in the marble and granite yard of Messrs. H. P. Rieger & Company, on Paca street, Baltimore, but non-union men were engaged to fill the places of the strikers. The stone cutters engaged on the Broome County jail at Binghamton also struck. The stone cutters of Newark, N. J., have made a demand upon their employers for weekly instead of bi-weekly payment. After some consultation the demand was granted.

Mr. Arlando Marine, dealer in marble and building stone, has removed his offices to the Transit building, 5-7 W. 42d street, New York City.

Vandals recently poured oil over a large and expensive granite tombstone in the cemetery at Friedensburg, Pa.

The H. P. Binswanger Company, dealers in all kinds of building stone, have removed their offices to the Market and Fulton Bank Building, 63 Fulton street, New York City.

Mr. J. C. Freeman, United States Consul at Copenhagen, reports to the State Department that Soren Schongaard has perfected an improved method of manufacturing artificial marble. The inventor is a Danish master builder and he claims that he can produce the material in any form desired—columns, plain or fluted, and capitals—as readily as flat slabs. It can be stained in color or be variegated like natural marble. It is also claimed that even pictures can be made of the material.

Monumental News

The movement for the erection of a monument at Washington to Gen. John C. Fremont is progressing. Back of the project is an association at Pittsburg, where Fremont was nominated for the Presidency.

The Andersonville Military Commission hopes to have its monument ready for dedication next October.

A monument to the Union soldiers is to be erected at Parkersburg, W. Va., at a cost of $3,700.

The commission appointed by Governor Odell to have charge of the erection of a $100,000 monument to the late President McKinley on Niagara Square, Buffalo, consists of Edward H. Butler, Wilson S. Bissell, John G. Milburn and George E. Matthews, of Buffalo, and Edward Curtice, of Fredonia.

A considerable sum of money has already been raised for a monument to the strikers at Lattimer, Pa., who were killed by the militia.

A year or two ago Miss Helen F. Mears, a Wisconsin sculptor, with a studio in New York, was commissioned to execute a statue of the late Frances E. Willard, to be erected in the Hall of Statuary at Washington by the State of Illinois. Miss Mears has been at work on the statue, but will not have it completed for a year. Meantime it has been discovered that the appropriation of $9,000 made by the Illinois Legislature to pay for the work has elapsed and is no longer available. It is expected that a new appropriation can be secured.

Watkins, N. Y., is raising a fund for a monument to Floyd J. Shoemaker, of the Ninth Regiment, who was killed in the Philippines.

Fourteen models have been submitted for the Jefferson Davis memorial arch to be erected at Twelfth and Broad streets, Richmond. The sum of $40,000 has already been raised, but it is hoped that the amount can be increased to $75,000.

The State of Pennsylvania will erect a $12,000 monument for its dead soldiers in the Andersonville National Cemetery.

E. Fremiet, the distinguished French sculptor, has completed a model for the equestrian statue of Gen. John Eager Howard, the Revolutionary hero, which will be erected in Baltimore. The work is paid for by private subscription.

A monument will be erected over the grave of the late W. J. Glenn, doorkeeper of the House of Representatives, at Cuba, N. Y. It will be paid for by the many friends of Mr. Glenn.

Elizabeth, N. J., will erect a soldiers' and sailors' monument on North Broad street at a cost of about $10,000. The sum of $3,000 has already been raised.

New Britain, Conn., will erect a monument over the grave of Private William Chute, of that town, who died at Camp Alger.

The Mexican Veteran Association, of Baltimore, will erect a monument to the soldiers who participated in that struggle, at Fayette and Liberty streets and Park avenue. Messrs. Hodges & Leach are completing plans for the memorial.

Perryville, Ky., will erect a twenty-foot Confederate monument surmounted with the statue of an infantryman. The contract has been awarded to the Peter-Burghard Company, of Louisville.

The Daughters of the Revolution, of Birmingham, Ala., will erect a marble shaft to the Confederate dead at that place.

The Grand Army of the Republic have been granted permission to erect a monument in Washington to Benj. F. Stevenson, the founder of the organization.

The United Magyar Societies of Cleveland have already raised more than $1,000 for the statue of Kossuth, to be erected in that city. It will be the work of Andreas Toth, an eminent Magyar sculptor, of Debrecen, Hungary.

The Ticonderoga, N. Y., Historical Society will erect a monument to Lord Howe, the brilliant young English officer who was killed near that village in the French-Indian War. His remains are buried in Westminster Abbey.

Snyder County, Pa., will erect a soldiers' monument at Middleburg, at a cost of $10,000. It will be 18 feet square at the base, 48 feet high and will contain a room, 12x12 x12½ feet. The dome will be built of Hummelstown brownstone, lined with

white marble. The dome will be surmounted by the figure of a bugler of heroic size, and there will be four eagles at each corner, while panels will commemorate the various wars of the country. There will also be statues of Lincoln and Governor Curtin. There will be forty columns and pilasters of Indiana limestone.

A monument will be erected at St. Augustine, Fla., to commemorate the volunteers who died in the Spanish-American War. The movement is inaugurated by the St. Augustine Rifles.

The G. A. R., of Leslie, Mich., will erect a monument.

An effort is being made to erect a Garfield monument at Elberon, N. J., where the martyred President died.

Miss Ann Whitney, of Boston, a distinguished sculptor, eighty years of age, has just completed a bronze statue of Charles Sumner of heroic size. It is likely to be erected in Cambridge, Mass.

An association has been formed in Atlanta to erect a monument to Major-General William H. T. Walker, the Confederate commander who was killed at the Battle of Atlanta.

The town of Caldwell, N. Y., on the shores of Lake George, will erect a bronze and granite memorial of the Colonial Wars in the shape of heroic statues of Sir William Johnson and his Indian ally, King Hendrick.

A project of raising money for a monument to the late Thomas M. Brumby, Admiral Dewey's flag lieutenant, will be taken up with renewed activity in Atlanta.

It is proposed to erect a $10,000 statue of the late Thomas Dunn English in Branch Brook Park, N. J.

The Polish organizations of Baltimore expect to erect a monument to Count Pulaski.

Philip Martiny's statue of Vice-President Hobart, which is to be erected in Paterson, N. J., was successfully cast in bronze at the Henry-Bonnard factory in New York.

The contract for the soldiers' monument which is to be erected at Middletown, O., has been awarded to C. L. Thiele, of Dayton, O., at $3,397.

Funds are being raised for the erection of a suitable monument in memory of Admiral Terney, of the French Navy, who died in America and is buried in a humble grave at Newport, R. I.

Col. W. H. Knauss will erect a statue of a Confederate soldier at Camp Chase, Columbus, O., where 2,260 Confederate dead are buried.

The plans for the erection of a monument to be erected at South Bend, Ind., call for a structure that will cost about $25,000.

Sculptor Charles H. Niehaus has completed a model for the General N. B. Furrest statue, which is to be erected at Memphis, Tenn., which represents the famous Confederate cavalry leader sitting on a horse at rest, holding the reins easily in his left hand while his right hand, clasping his cavalry hat, rests on his hip. The pose is simple but dignified.

A Lithographic Stone Quarry in Russia.

In all parts of the United States there has been great activity in the search for lithographic stone. Frequent attention has been called in these columns to the fact that there seems to exist an impression that there is a market for all of the stone of this kind that can be produced, and that few stone properties would pay better. It has been explained that this delusion is probably fostered by the knowledge that most of the stone put upon the market comes from the Bavarian quarries and that it is sold by the pound instead of by the cubic measurement like other stone. Periodical reports of the exhaustion of the Bavarian quarries gives renewed activity to the American prospectors for this material. It is now announced that a new quarry of lithographic stone has been opened near Verisovitch, a station on the Uscub-Mitrovitza line, Russia. A report on the stone by the authorities of the Imperial Institute declares that it is of high quality.

Frost as Quarrying Agent.

A somewhat remarkable quarrying feat was accomplished at Aberdeen, Scotland, recently. A large stone had been drilled ready for splitting when the thought struck the foreman that nature might aid in the object to be attained, the idea being suggested by the severe frost which prevailed. Water was poured into each of the drill holes, and it being Saturday afternoon, work was suspended until Monday morning, when it was found that the block of granite had completely burst open. An idea of the immense power of the frost will be gathered when it is stated that the stone thus detached measured 12 feet by 5 feet, and has a weight of about six tons.

The Slate Trade

Charles Johnson, of Norristown, Pa., has been elected president of the Montgomery Slate Company, owning quarries at Danielsville, in place of the late Senator Stroh of Carbon County. Maurice F. Trexler, of Lehighton, has been chosen vice-president in place of Mr. Johnson.

An excellent quality of black slate has been discovered on the Adams County side of South Mountain, near Hagerstown, Md. Last fall a very fine roofing slate was found near Buena Vista, and since then a fine deposit of granite was found on the other side of the mountain.

The Mathews Consolidated Slate Company has been incorporated under the laws of New Jersey with principal offices at 243 Washington street, Jersey City. The capital is $600,000. The incorporators are Charles N. King, W. Monds Green and Daniel C. Stanwood.

W. D. Paules and J. H. Moyer, of Slatedale, have leased a tract of land from Moses Schaffer at Burnville, Pa., and will operate a slate quarry. A sixty-foot vein of blue and green slate has been found and a green vein of a foot.

The California & Bangor Slate Company, of Oakland, Cal., has been incorporated under the laws of Arizona, with a capital stock of $500,000. The incorporators are H. M. Todd, E. C. Robinson, James B. Merritt, Fred Saudelin and Thomas M. Robinson. The company will develop slate quarries in Maricopa County, Arizona.

A company has been organized at Richmond to develop slate quarries near Arvonia, Buckingham County. The vein of the new quarry runs about ten feet below the surface and shows a high degree of purity. A forty-horsepower boiler is being installed and twenty experienced quarrymen are now employed. Drilling is being done at present by steam power, but a compressed air plant will shortly be added. The officers of the company are: Wilbur Turner, president; C. H. Clark, vice-president and manager, and F. S. J. Brodley, secretary and treasurer.

The slate quarry at Steinsville, Pa., owned by William Henry, has been leased by John Daniels & Sons, and is now being worked.

The Reading "Eagle" gives an interesting account of the growth of Northampton County as a direct result of the slate industry. The writer says: "From Portland on the Delaware to Slatington on the Lehigh there is a succession of thrifty and growing towns and villages stretched along the entire northern boundary of the county in the shadow of the Blue Mountains. Steam railroads have been built, electric cars whiz by, water and gas companies have been formed, and the town boasts of banks and churches, handsome school buildings and beautiful residences, where but a few years ago there was nothing but the brush patch or farms. It seems that this has all grown in the night, and the end is not yet. The Old American Slate Company, the Old Bangor Slate Company, the pioneers in the business, and that of the Chapmans, have grown and extended themselves until now Northampton County produces three-fourths of all the slate manufactured in the United States, and the entire world is its market. The name of Bangor, Pen Argyl, Albion, Chapman, Slatington, etc., are well known from the Atlantic to the Pacific, and from the Lakes to the Gulf. Carload after carload of Northampton's product is shipped daily. Bangor has grown to be a town of about 6,000 or 7,000; East Bangor, 1,500; Pen Argyl, 4,500; Wind Gap, 1,200, and Slatington, 5,000, where but a few years ago they were little insignificant villages. On the average two new quarries are opened every year, and our census shows that our population has increased about 60 per cent. each decade."

The entire tendency of the times is toward the more frequent payment of working men. The labor unions have kept up a constant agitation on the subject, and in place of payments once a month, as was formerly the rule, they have now succeeded in bringing about an almost universal adoption of weekly payments. An interesting insight into the peculiar methods that formerly obtained in the old world is given in a sketch of "Slate in Scotland" that appears in "The Slate Trade Gazette," of Hull, England. In the current number this takes up the Easdale quarries. These were formerly worked in a primitive way, and as they are on an island they were

doned after they were sunk below the level. In the eighteenth century the riment was tried of installing a pump was obtained from the wreck of a cast- ship. By this means beds of slate it was thought had been abandoned ver were once more made available. a long period prior to 1841 the quar- had been leased to a company, in h successive representatives of the e of Breadalbane were shareholders. the expiration of the lease in the year d, the late Marquis of Breadalbane be- to work the quarries on his own ac- t and continued to do so until his in 1862. He instituted many reforms, especially in the condition of the working people. The old company had made a practice of paying the slate makers only once a year and then only according to the quantity of slates that had been sold, no reckoning being made for the quantity added to stock. The Marquis introduced the system which still prevails of paying at short intervals without reference to sales.

Limes and Cements

It is announced that if a certain amount of stock is subscribed by local capitalists a large cement plant will be erected at Huntsville, Ala.

Daniel Pierson, Jr., of East Orange, N. J., and C. J. Curtin, owners of a cement mill at Marksboro, N. J., have options on 165 acres of shell limestone near Holdridge's quarry at Catskill, N. Y., and on 46 acres of clay lands in Blivenville, N. Y., and are considering the erection of a plant with a capacity of 1,500 barrels at the latter place.

The lime kiln sheds of Finch, Pruyn & Co., at Glens Falls, N. Y., was destroyed by fire recently. The loss was estimated at $10,776, partly insured.

The Empire Portland Cement Co. will rebuild its plant at Warner, N. Y., which was destroyed by fire last winter.

The Granite Portland Cement Co., of Cleveland, O., has purchased a tract of land four miles east of Clyde, N. Y., from Dr. Thomas H. Smith, of Bloomington, Ill. It is expected that the company will erect a 1,000 barrel plant on the property.

In the gas burning kiln of the Rockland-Rockport Lime Co., at North End, Rockland, Me., an improvement has been introduced by the mixing of sawdust with the coal or culm. This serves to deaden the fire and thus check the production of gas and to aid in the more thorough combustion of the coal.

The Farnam Cheshire Lime & Cement Co., recently organized with increased capital, will greatly improve its plant at Farnam, Mass. The president of the company is Thomas Barrington, of New York. The secretary is Willis Holly, an old newspaper man, of New York, and former secretary and chief clerk to Mayors Grant and Gilroy. Mr. Holly was also secretary of the Park Board from 1898 to 1901.

The Guarantee Cement & Stone Co., of Minneapolis, has been incorporated with a capital stock of $25,000.

A new company has been incorporated under the laws of Wisconsin, known as the Rock Island Plaster Co. The capital stock is $250,000. The incorporators are F. W. Paschal, of Joplin, Mo.; G. A. Bush and F. A. Bush, of Houston, Tex., and P. H. Bousgnet, of Des Moines.

A company is formed to develop immense deposits of gypsum in New Mexico. The material is found at several points along the Rhode Island route and in great quantities at Ancho, a point near the Jicarilla mountains, in Lincoln County. A plant will be established at this place for the manufacture of stucco and cement for building purposes.

The Urschel White Lime Co. has been incorporated at Columbus, O., with a capital of $30,000. The incorporators are J. J. Urschel, J. M. Dotson, and others.

The Union Lime Co., with a capital stock of $750,000, has been incorporated at Milwaukee, for the purpose of taking over the Ormsby Lime Co., of Milwaukee; the Cook & Brown Lime Co., of Oshkosh, and the Marble Head Lime Co., of Chicago. The companies thus merged are said to have control of the best lime kilns in Calumet and Fond du Lac counties. The leading men in the new combination are O. W. Robertson, Charles Weiler, of Milwaukee, and R. C. Brown, of Oshkosh.

The Oklahoma Cement & Plaster Co. has called a meeting of the stockholders to vote on dissolving the company, having sold out its business to the United States Gypsum Co.

The Lawrence Cement Co. has reduced its capital stock from $300,000 to $150,000.

The Consolidated Cement Co. has opened its mills at Eddyville, which have been closed two years, thereby giving employment to 225 additional men.

The Wheatland, N. Y., Land Plaster Co. will enlarge its plant at Wheatland by the addition of a calcine plant.

The Portland Cement Works at Dallas, Tex., the largest factory of its kind in the South, is to receive extensive additions.

The American Cement Post Co., of Janesville, Wis., will start work with about 100 men. The company will manufacture fence posts of cement.

The Rockland Lime Co., of Rockland, Me., has voted to increase its capital from $200,000 to $500,000 for the purchase of limestone property in Vermont and Massachusetts. The directors of this company are James Farnsworth, Robert W. Messer, James H. McNamara and William P. Hurley, of Rockland, and J. W. Hurley, of New York.

A. H. Ingham, of Santa Rosa, Cal., has leased a ledge of limestone rock near Cloverdale, Sonoma County, and will begin the manufacture of lime.

A new corporation known as the Scotts Cement Post & Tank Mfg. Co., Ltd., has been organized with $20,000 capital stock and will locate at Scotts, Mich., with branches at Kalamazoo and Lawton. The company will manufacture cement fence posts and water and stock tanks for farmers.

Charles G. Crawford, of Chicago, proprietor of large plaster mills at Fort Dodge, Ia., has secured options on a tract of gypsum plaster land in Walker Township, near Grand Rapids, Mich., and is arranging for the construction of a large plaster mill.

Preliminary surveys have been made for the immense Portland cement plant which is to be erected at Bedford, Ind.

Forty Virginia negroes employed in the quarries of the Wrightsville Lime Co., near Bainbridge, Pa., struck for an increase of wages recently. About 160 Italians refused to join them, but were driven away by the negroes at the point of revolvers. They afterwards fired upon the sheriff, but were driven off and some of them were caught and imprisoned.

George Mowbray, individually and trading as the Standard Lime & Cement Co., of Philadelphia, has been adjudged a voluntary bankrupt. Liabilities, $7,964.47; assets, $16,040.99.

The Acme Cement Plaster Co., of Larimer, Wyo., will increase its plant. The factory will also be run night and day.

The Maryland Lime & Cement Co., Classen & Diggs, of Baltimore, have sold to the Baltimore & Ohio Railroad 30,000 barrels of Lehigh Portland cement for delivery in 1902.

Hill & Holt have opened a new flagstone quarry on the Lycoming Creek between Powys and Trout River, Pa.

The large new plant of the Empire Limestone Co., at Amherst, N. Y., is nearing completion. Three 150 horse-power boilers will be installed. About 60 men and 15 teams are now employed.

Patrick Quirk has leased the Fuller bluestone quarries at Quarryville, N. J., and begun to operate them.

Mr. Isaac Stephenson has been core-drilling his property at Marinette, Wis., and has discovered a ledge of fine limestone at a depth of fourteen feet from the surface. The stone is said to be superior to any in the neighborhood. A quarry will be opened at once.

Petitions are being circulated in Ohio asking the United States Government to construct the new post office at Cleveland of the North Ohio stone. The old building which is now being torn down was constructed of the Ohio sandstone, and it weathered admirably. Indeed so good has the old stone from the post office lasted that it is being used in the construction of the immense new edifice for St. Francis's Catholic Church on Superior and East Madison streets. While it is manifestly impossible for the government to give preference in every instance to local stone for Federal buildings, it would seem to be only proper to use the native product when it is so thoroughly proven as the Ohio sandstone.

James H. Holman, of Hopkinsville, Ky., has leased a quantity of land near Columbia, Tenn., where he will operate a stone quarry in connection with the Louisville & Nashville Railroad. Machinery to the value of about $12,000 will be installed at once. Mr. Holman already has contracts for 30 carloads of crushed stone a day.

The Orleans Sandstone Co., of Syracuse, N. Y., has been incorporated to quarry and deal in stone. The capital is $15,000. The incorporators are: Patrick R. Quinlan, I. Hoyt Gallup, Willard H. Losee, S. Bentley Kenyon and John Balmforth, all of Syracuse.

A company is being formed in Baltimore for the purpose of opening quarries on the east side of the Shenandoah River, opposite Millville, W. Va. Mr. Charles Becker, who owns a large tract of land in that locality, is the promoter of the new enterprise. Limestone of high grade is said to be found in inexhaustible quantities. Surveys are being made for a spur connecting with the B. & O. R. R. The company proposes to build a bridge across the Shenandoah for the transportation of stone from the quarries to the railroad and to install a cable system to operate the cars.

The Johns & Stebbins Spring River Quarry at Carthage, Mo., has installed new machinery in its mill, which about doubles the capacity of the plant.

The Bowling Green Stone Co., of Bowling Green, Ky., has passed into the control of Louisville capitalists. The new company, which is capitalized at $100,000, in place of the $75,000 of the old company, takes over all of the property of the old Bowling Green Stone Co. The new company is known as the Bedford Bowling Green Stone Co., and its officers are: Lee Bloom, president; E. Y. Johnson, general manager, and G. S. Briggs, secretary and treasurer.

Contracts and Building

Government Work.

Fort Myer, Va.—Estimates for additional barracks, gun sheds, officers' quarters, etc., amount to $159,356.

Washington, D. C.—The "omnibus bill" passed by the House of Representatives, provides for the erection of seventy-seven new buildings and sites, six buildings on sites already bought, seventeen buildings on sites given for the purpose, and fifty-eight increases in appropriations previously made. The total amount carried by the bill is $17,405,450. One of the buildings provided for is a post office at St. Louis to cost, with the site, $550,000, and one at Providence to cost, with the site, $1,000,000.

Superintendent of the Capitol Woods has submitted estimates on the proposition to extend the east front of the central part of the Capitol to the line of the House and Senate wings. The figures are $2,500,000. The estimate for remodeling and redecorating the interior of the rotunda is $275,000.

As the result of the competition for plans for the new Municipal Hospital to be built at the head of Thirteenth street, the Commissioners of the District of Columbia have selected Frank Miles Day & Brother, of Philadelphia, as the architects. The estimated cost of the hospital is $3,000,000, and it will consist of separate groups of buildings, thirty-six in all. They will be built of red brick with Indiana limestone trimmings.

State, County and City Buildings, Hospitals, etc.

Annapolis, Md.—A new annex, containing chambers for the two Houses of the General Assembly, committee rooms, etc., will be built to the State House after plans by Baldwin & Pennington.

Birmingham, Ala.—Plans for the new Hillman Hospital are being prepared by Charles Wheelock & Sons. The building will be of brick and stone, and will cost about $100,000.

The Birmingham Medical College will erect a new four story building containing amphitheatres and laboratories.

Crookston, Minn.—The Sisters of St. Benedict will erect a hospital, costing from $25,000 to $30,000.

Des Moines, Ia.—The State Board of Control will erect a new hospital, laundry and other buildings at Marshalltown, costing $50,000; a cottage at Glenwood, costing $25,000; a boiler house at Davenport, costing $20,000; a power house and workshop at Fort Madison, costing $25,000; a laundry and other buildings at Mt. Pleasant, costing $16,000, and a cold storage plant at Clarinda, costing $15,000.

The Methodist Hospital expects to erect a new building here costing $50,000.

Fayetteville, W. Va.—The new county jail is to be erected at a cost of $40,000.

Grafton, Ohio.—Jerome Wheelock has left $100,000 to the town which will be used for the erection of a town hall in which there is to be a statue of the donor or else a statue of heroic size is to be erected on the common.

Milwaukee, Wis.—A new building will be erected for the Children's Free Hospital, at a cost of $25,000 to $30,000.

Nashville, Tenn.—A new armory building to cost $40,000 is to be built for the Gaines Rifles after plans by Thomas S. Marr.

Richmond, Va.—The general plans decided upon for the repairing and enlarging of the State Capitol, call for an addition of twenty feet along the north front and a general modernizing of the interior. No change whatever will be made in the architectural plan, which was designed by Thomas Jefferson. An appropriation of $100,000 is available for the purpose.

The Virginia Penitentiary will erect a new cell building at a cost of $180,000.

The Richmond Male Orphan Asylum will erect a new building.

Woodville, Miss.—The plans of the J. Gordon Riley Company have been accepted for the new court house to be erected here at a cost of $40,000.

Churches, Convents and Synagogues.

Americus, Ga.—W. F. Denny is preparing plans for a $20,000 Methodist church.

Baltimore, Md.—The contract for the

erection of the Babcock Memorial Church at Madison and North streets has been awarded to Hiltz & Sons. The cost will be about $60,000.

Baltimore, Md.—St. Luke's Lutheran Congregation will build a new church at Hampden, this city, after plans by T. B. Ghequier. It will have a tower nearly 100 feet high and will be faced with Woodburn granite. It will be of English Gothic style.

Birmingham, Ala.—The First Baptist congregation will erect a new church at a cost of about $40,000. The structure will be of brown stone taken from Red Mountain, near this city. Plans have not yet been adopted.

Bristol, Tenn.—The State Street Methodist congregation will build a new church at a cost of $23,000.

Columbus, Ga.—The St. Paul Methodist congregation will erect a $30,000 church.

Durham, N. C.—St. Phillips Episcopal Society will erect a new stone church.

Fond du Lac, Wis.—A Catholic Home for the Aged, costing $20,000, will be erected after plans by E. D. Werner.

Houston, Texas.—The First Baptist congregation will build a $40,000 church of brick with stone trimmings after plans by A. N. Dawson.

Manoa, Pa.—The Trinity Lutheran congregation will build a new church of stone after plans by Charles Bolton & Company, of Philadelphia.

Morgantown, W. Va.—A $60,000 Methodist church will be erected here.

Nashville, Tenn.—A Presbyterian church to cost $25,000 will be built at Monroe and Buena Vista streets.

Nashville, Tenn.—Bishop Thomas Byrne has purchased six lots in the West End. It is expected that a magnificent Catholic church, episcopal residence and high school will be erected at a total cost of between $300,000 and $400,000.

Old Point Comfort, Va.—St. Mary's Catholic congregation will erect a $30,000 Catholic church after plans by New York architects.

Schools, Colleges and Libraries.

Cedar Rapids, Ia.—St. Patrick's Church will erect a parochial school costing $20,000.

Columbus, Ga.—A new school building of brick with stone trimmings will be erected after plans by Lockwood Brothers.

Cooleemee, N. C.—The Cooleemee Cottons Mills will erect a modern school for the children of their operatives.

Cottonwood, Minn.—Plans are invited for a six-room modern brick school building. Address A. O. Anderson.

Ellendale, N. D.—It is expected that additional buildings will be erected at the Industrial School.

Iowa City, Ia.—A number of new buildings will be erected at the State University after plans by Proudfoot & Bird. There will be a chemistry building costing $32,000, an anatomy building costing $25,000 and pathological and physiological buildings to cost $70,000.

Lafayette, La.—A new school house is to be erected here at a cost of $24,000.

Louisville, Ky.—A new school costing $30,000 will be built after plans by Harry P. McDonald.

Marinette, Wis.—A brick and cut stone school house will be erected here after plans by Fremont D. Orff, of Minneapolis.

Nashville, Tenn.—A general competition will be held for plans for the new Carnegie library here, the maximum cost of which will be $75,000.

Oil City, Pa.—Plans for the new Carnegie library have been completed by Charles Bolton & Company, of Philadelphia. It will be two stories high, and will be of brick and terra cotta.

Ruston, La.—A thirty-two room dormitory will be built at the Industrial Institute at a cost of $35,000.

St. Paul, Minn.—The Sisters of St. Joseph will erect a group of buildings at their Academy on Cleveland and Randolph streets at a total cost of $150,000. J. H. Wheeler is now preparing plans for the first of these, an administration building of brick and cut stone to cost $60,000.

Philadelphia, Pa.—St. Anthony of Padua congregation, Rev. Father Masterson, will build a new church of brick and stone trimmings on Fitzwater street, near Twenty-third street. Plans by Frank R. Watson.

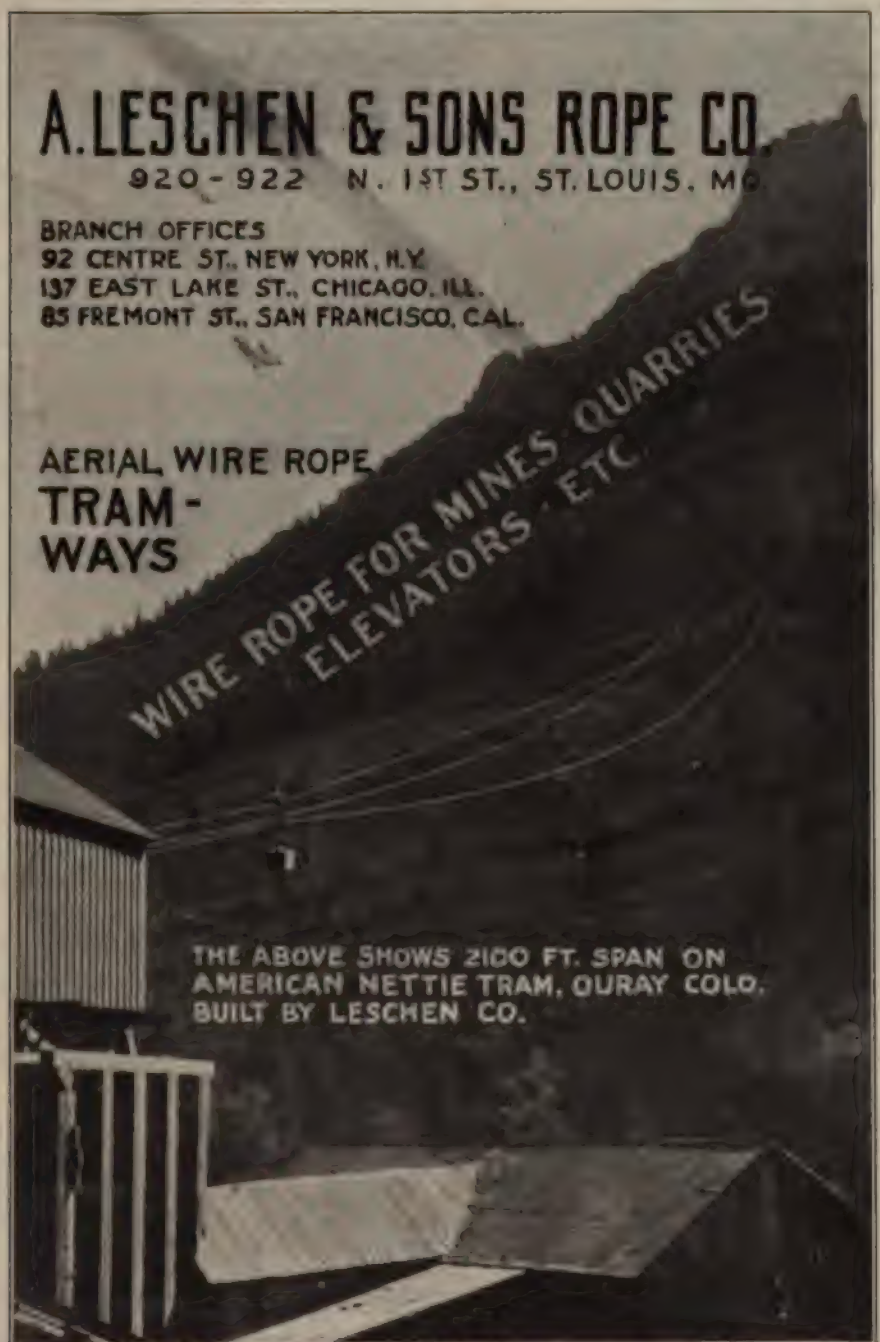
San Antonio, Texas.—The contract has been let for the new Jewish Synagogue, which is to cost $30,000. It will be at Jefferson and Travis streets.

Spokane, Wash.—Our Lady of Lourdes Catholic congregation will erect a new church costing $75,000. Plans by Preusse & Zittel.

Business Buildings, Theatres, Hotels, Society Halls, Etc.

Anniston, Ala.—A $75,000 hotel will be erected at Noble and Twelfth streets by William H. Zinn.

Baltimore, Md.—Simpson & Doeller Company, printers, will erect a four story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warehouse at Federal and Port streets, costing about $50,000.

Berkeley Springs, Va.—The Berkeley Springs Hotel Company has been organized to build a $200,000 hotel.

Cleveland, Ohio.—The Wellman-Seaver-Morgan Engineering Company is building a 400 x 120 foot addition to its plant.

Columbia, S. C.—The contract for the erection of the new twelve story Robertson building here has been awarded to M. T. Lewman & Company, of Atlanta.

Duluth, Minn.—A Masonic Temple, costing $75,000, will be erected at Second avenue, East and Second streets. Plans have not been completed as yet.

Fort Dodge, Ia.—A new hotel with lodge rooms for the Elks will be erected, costing $100,000.

Gilford, Md.—The Maryland Granite Company will erect a large hotel boarding house at their quarries here, about 200 feet long and 50 feet wide, to accommodate near two hundred boarders.

Harvey, Ia.—Herman Ruthfield will build a fifty-room hotel after plans by C. E. Eastman & Company, Des Moines.

Jacksonville, Fla.—The Seminole Club will erect a new club house after plans by Owens & Sisco. It will be of brick with sandstone trimmings and will cost $15,000.

Louisville, Ky.—The new building for the Grand Lodge of Masons to be erected will cost $170,000.

Marshfield, Wis.—J. C. Marsh will build a business block of pressed brick and Bedford stone after plans by J. H. Jeffers & Co., Wausau.

Milwaukee, Wis.—Plans are being prepared for a $50,000 residence for Patrick Cudahy.

Omaha, Neb. —G. A. Joslin will erect a $100,000 residence at Davenport and Fortieth street of Silverdale buff limestone. E. O. Hamilton has the contract.

The Nebraska Telephone Company will erect a branch exchange and shop building at Thirty-third and Harney streets, costing $150,000.

Paducah, Ky.—A society building, costing $40,000, will be erected by the Masons and Odd Fellows.

Perth Amboy, N. J.—The Standard Underground Cable Company will erect a $500,000 copper wire drawing plant here.

Petersburg, Va.—The Elks propose to erect a seven story office building, which will also contain lodge rooms, at a cost of $75,000.

Philadelphia, Pa.—Cramp & Sons will make improvements and extensions to their plant at a total cost of $4,000,000.

Piedmont, Ala.—The Koosa Manufacturing Company will erect a new $100,000 plant. A. G. Thatcher, Wilmington, Del., president.

Pine Bluff, Ark.—The Elks will build a $30,000 opera house here after plans by R. H. Hunt, of Chattanooga.

Richmond, Va.—The contract for building the new Zimmerman Hotel at Seventh and Broad streets has been awarded to E. Tatterson, of Norfolk, at $227,758.29.

Richmond, Va.—Binswanger & Company will erect a six story brick and stone warehouse.

St. Paul, Minn.—Jacob Litt will erect a four story building next to the Grand Opera House after plans by D. J. Donohue. It will probably be of Portage Entry red sandstone.

San Antonio, Texas.—The City National Bank will build a $50,000 banking building on Commerce street.

Sault Ste. Marie, Mich.—Victor E. Metzger will erect a brick block, costing $30,000, with cut stone front and two pillars. Plans by J. C. Teague.

Sheboygan, Wis.—A $25,000 opera house will be erected.

Williams, Ia.—J. P. Talcott will erect a business building of pressed brick and Farley stone, after plans by Murphy & Ralston, Waterloo.

Bridges, Depots and Railroad Works.

Baltimore, Md.—The Philadelphia, Wilmington and Baltimore Railroad expect to build new stations at a number of points in Maryland, such as Lambson, Black, Kennedyville, Hepbron, Lynch, Trappe, Federalsburg and Chestertown.

Birmingham, Ala.—The Birmingham Railway, Light and Power Company will erect a car barn and car shops, occupying a full city block. The structure will be entirely of brick and stone with concrete floors. Total cost will be about $100,000.

Bridgeport, Conn.—The New York, New Haven and Hartford will build a new freight house on Main street at a cost of about $50,000.

Columbus City, Ind.—Whitley County will erect three stone arches or culverts. William H. Carter, County Auditor.

Columbus, Ohio.—The Pennsylvania Railroad Company is contemplating extensive improvements here, including new engine and power houses, an erecting shop and additions to other shops, at a total cost of $500,000.

A viaduct will be built over the railroad tracks on Cleveland avenue.

Everitt, Wash.—The Great Northern Railway will build a new passenger station here.

Fort Wayne, Ind.—The Pennsylvania Railroad Company expects to expend about $450,000 for improvements, including the construction of a new engine house, erecting shop and storage house, and the installation of a large coaling plant.

Gladstone, Mich.—The Soo line will expend $1,000,000 in reballasting its line to the Soo.

Great Falls, Mont.—It is expected that the Great Northern Railroad will build a new passenger station here.

Harrisburg, Pa.—State aid is asked for the rebuilding of 28 bridges in various parts of the State at an estimated cost to the commonwealth of $500,000 to $1,000,000. Owing to these petitions it is said that the Legislature will be asked to repeal the law requiring the State to pay for rebuilding or repairing bridges destroyed by high water, etc.

High Point, N. C.—The Southern Railway will erect a large freight depot here.

Indianapolis, Ind.—A steel girder bridge will be erected over White River at Washington street, the county council refusing an appropriation of $65,000 extra necessary for a stone bridge. The total cost of the structure is estimated at $147,000.

Janesville, Wis.—The Chicago, Milwaukee & St. Paul will build a $30,000 station here.

Kansas City, Kansas.—A viaduct will be built at Tenth street, at a cost of about $90,000.

Lancaster, Pa.—A stone arch bridge with two arches of forty-foot span will be built across Pequea Creek. A. B. Hassler, County Controller.

Memphis, Tenn.—It is reported that the Illinois Central will make Memphis a center of its shop system and will expend about $500,000 in the erection of a plant.

Milwaukee, Wis.—The Milwaukee Railroad will spend $800,000 in making improvements in the West Milwaukee shops.

Monterey, New Mexico.—The union passenger station will probably be erected by the railroads entering this place.

New Haven, Pa.—The Pittsburg & Lake Erie will build a new passenger station here at Monongahela City.

Newport, Ind.—A stone arch will be built over Norton Creek on the State Road. William P. Bell, County Auditor.

Onawa, Ia.—The Chicago & Northwestern will probably build a passenger station here.

Rochester, N. Y.—Plans and specifications will be made for a stone, a concrete and steel, and a steel bridge to replace the Vincent Street bridge over the Genesee River. The kind of a bridge to be erected will be decided later.

St. Paul, Minn.—The estimated cost of the new Omaha freight station here at Broadway and Prince street is $46,000.

Selma, Ala.—The Western Railroad of Alabama will build a $30,000 passenger station here.

Sioux City, Ia.—The Chicago, St. Paul, Minneapolis & Omaha Railroad will erect shops and other structures here at a total cost of $250,000.

Wilkesbarre, Pa.—Luzerne County will about July 1 let contracts for 37 county bridges including some stone arch structures. George R. McLean, Controller.

Winston-Salem, N. C.—Plans are now being prepared for a new passenger station for the Southern Railroad here.

An Architectural Statue for South Africa.

A colossal statue of Portland stone has just been completed for the central niche of the main facade in the printing house of George A. Riches, at Durban, the garden city of Natal, South Africa. The statue is an ideal representation of "Engraving." A female figure, artistically draped, gazes upon a tablet upon which is cut the following inscription:

"All honor to labor I sing,
And riches to Riches I bring."

The statue was the work of Harry Hems & Sons, of Exeter, England.

A Huge Granite Boulder for Shiloh.

The Wisconsin Commission charged with the selection of a monument to the soldiers of that State to be erected on the battlefield of Shiloh, will probably decide upon an elaborate bronze figure or group. The commission would like to use for a base for the monument a large granite boulder that lies in a field near Waupaca, but as it is ten miles from railroad or navigation and is an immense stone, it is feared that the transportation will be too great a problem. The monument will not be erected until fall or next spring as the allotment of ground for it has not received the endorsement of the Secretary of War.

Business men in Ludlow and Covington, Ky., are considering the formation of a large company for the manufacture of cement.

Trade Notes

The Steam Stone Cutter Company, of Rutland, Vt., has just issued an illustrated catalogue devoted to the Wardwell stone channeling and quarrying machine. This illustrates the number one single gang machine, with boiler attached, and also with the boiler detached for cutting extreme angles; the number two double gang machine for marble and limestone, and the number three double gang machine for grit sandstone. The Wardwell channeler is known to all stone men, and its many merits have been demonstrated by years of operation in all kinds of stone and under varying circumstances. The single machine cuts from fifty to one hundred square feet of channel in marble, and from 150 to 300 square feet in limestone per day, and will do the work of twenty-five men. The double machine cuts from 100 to 200 square feet of channel in marble and from 300 to 600 square feet in limestone and sandstone per day and will do the work of fifty men. It is thus easy to calculate that the machines in good hands can save their entire cost in net earnings in six months. The list of quarries using the Wardwell channeler, as given in this circular, is an impressing one, ranging from companies that use 50, 40, 24, 22 and 18 machines each, down to the many that have but one and two each. The testimonials that are printed show a remarkable record, not only in the small amount of repairs needed, but in the enormous amount of work accomplished. One machine shows a record of 700 feet cut in one day of thirteen hours in Lake Superior sandstone, and another shows 250,000 cubic feet cut in ten months with two machines. The catalogue will be sent upon request.

The Jeffrey Manufacturing Company, of Columbus, Ohio, have issued a very attractive catalogue, number sixty-seven, devoted to the many styles of belt conveyors which they manufacture. These machines are designed for the handling of ores, rock, stone refuse, gravel, earth, coal, ashes, grain, packages, etc. The many illustrations contained in the catalogue show the conveyors put to these various uses. The Jeffrey Company also manufactures crushers and revolving and vibrating screens, which are shown in the catalogue. The Jeffrey bucket elevators are largely used for the handling of broken stone, and many of the equipments of various kinds have been installed by stone companies throughout the country. The various catalogues dealing with the different lines of machinery can be had on application.

We have received from the Trenton Iron Company, of Trenton, N. J., an interesting illustrated pamphlet entitled "The Application of Wire Rope to Haulage, Shafts and Inclined Planes," by William Hewitt, M. E. This is a reissue of the chapters on the same subject in a former book issued by the Trenton Iron Company, entitled "Wire Rope Transportation in All Its Branches." The subject matter, however, has been carefully revised and several changes made, and new matter and illustrations added, to bring it into accord with present practice, so that it possesses the interest of a new book. The ease with which wire rope can be led in any direction and over any grades, its comparative safety and high efficiency, have led to its wide adoption in various lines of industry. It possesses many advantages that no other method of transportation has, and this will keep it in favor for particular industries despite every improvement that may be made in electrical and other transportation. For certain kinds of quarrying work nothing could be better suited than wire rope haulage. Mr. Hewitt describes the "tail rope" and the "endless rope" systems with great fulness, showing the methods of operation and the advantages of each. Among the many interesting illustrations are one of an endless rope installation by this company at the Pitch Lake, Trinidad, and one of a hoist built for a Manganese company at Colon, Columbia. Other illustrations show details of construction for various kinds of haulage. While the Trenton Iron Company is prepared to furnish the equipments for the different methods of haulage described and illustrated, the book is issued more as a guide to those contemplating the installation of such lines rather than a catalogue of the manufactures of the company. It will be mailed on application free of charge to interested parties.

The Harrison Supply Company, 32 Indian Wharf, Boston, Mass., has recently been appointed exclusive agents for the United States and Canada for the Aberdeen Iron Grit Company, Aberdeen, Scotland. This concern manufactures the famous Scotch shot known throughout the length and breadth of the country. The Harrison Sup-

ply Company, which handles only guaranteed goods, is also exclusive agent for the United States and Canada for Harrison Bros.' celebrated shot, that has been widely used in the trade. The company has made an importation, which has just arrived, of seventy-eight tons of shot, besides other large shipments of the shot made direct from the factory to San Francisco, Cal.; St. John, N. B.; Toronto, Ont., and Montreal, Quebec. Mr. Nathan C. Harrison, the general manager, says that the company is doing four times the business it had last year and that its trade is increasing steadily. Besides shot, the company deals in all kinds of polishers' supplies. Samples and prices will be sent to any one on request.

The Cleveland Pneumatic Tool Company have appointed the Compressed Air Machinery Company, of San Francisco, Cal., to represent them on the Pacific Coast.

An entertainment that is worthy of more than passing notice was held in Detroit recently. This was a banquet given by W. H. Anderson & Sons, of that city, to twelve heads of departments in celebration of the thirtieth anniversary of continued service of the foreman of the company, Mr. Frank P. Christa. The stability of the concern and the mutual loyalty that exists between it and its employes, is shown by the fact that the total term of service of the twelve heads of departments is no less than one hundred and twenty-four years. The banquet was followed by a most enjoyable evening of song and story, marred only by the absence of the founder of the company, Mr. A. H. Anderson, who was unable to be present owing to his having undergone a critical surgical operation but a short time ago. When the business was established in 1871, the only line manufactured was stone and marble working tools. To-day it not only covers that line completely, but also covers tools and supplies for general contractors, building, sewer and paving contractors; railroad, telephone and telegraph construction companies. The company also produces special iron and steel forging for automobile, gasoline and steam engine and agricultural implement manufacturers. No concern is better known among the stone workers of the country than this, not only by reason of the excellence of its products, but also for its fair dealing.

The Mine and Smelter Supply Company, of Denver, Colo., has recently opened a branch office at 139 Liberty street, New York. The company also has branch offices at Salt Lake City, El Paso, and the City of New Mexico, where its machinery and supplies of all kinds can be procured. The company has just issued a new circular devoted to the Durkee drill, which should be in the hands of all stone men. This drill is driven by a small electric motor, provided with speed controlling devices, through which the speed of the drill is controlled as readily as by the throttle valve of the air drill. The power of the motor is conveyed to the drill through a short flexible shaft, which allows the motor to be placed in any convenient position close to the drill. The piston of the drill, through a simple mechanical device, is given a rapid forward stroke and a much slower return. This rapid forward stroke concentrates the power upon the rock, while the comparatively slow return stroke gives a powerful pull to release a drill from a fissured hole. To prevent shock on the mechanism of the drill, buffer springs are used, through which the power is transmitted to the piston. An incidental result of these is that as the springs are compressed by the inertia of the piston on the back stroke their expansion adds to the work delivered through the piston. The drill is run at such speed as to take full advantage of this action. The many advantages of the electrical driven drill need not be commented on at length. The drill can be used with full effect at any distance from the source of the power and there is no trouble in conducting the power over rough and broken ground. Experience has proved that the drill is economical in operation and so many quarries make use of the electrical power that there would be little trouble in an installation. Aside from the drills, the company sells all kinds of hoisting engines, conveyors, revolving screens, crushers, air compressors and general supplies for quarries and mines. A copy of their catalogue can be had upon application.

Frenier & Son, of Rutland, Vt., whose sand pumps are known to stone workers in all parts of the country, are now furnishing their sand feeds for twelve gangs of the American Quarries Company at Stonington, Ind., twelve new gangs of the Bedford Quarries Company, at Bedford, Ind., six gangs of the Perry-Matthews-Buskirk Stone Company, at Bedford, eight gangs for Norcross Bros. Company's, new mill at New York City, eight gangs for Fred Andres Co., of Milwaukee, Wis., and four gangs for the Hummelstone Co., Cincinnati, O., and many more to feed two and three gangs.

Book Reviews.

TWENTIETH ANNUAL REPORT OF THE GEOLOGICAL SURVEY. Charles D. Walcott, Director. Part V. Washington: Government Printing Office.

The two volumes which make up Part V. of the Twentieth Report are devoted to the Forest Reserves, Henry Gannett, Chief of Division. This is a particularly interesting series of reports and owing to its many beautiful illustrations it will appeal more strongly to the general reader than many of the more technical sections. At the time the report was compiled the area of the forest reserve reached a total of 46,169,249 acres, or 72,139 square miles. In the various reserves there has been a tremendous loss of timber from forest fires, but most of the destruction was before the sections had been set apart from settlement by the Government. Many of the burned districts are being reforested under the operation of natural processes, but in some instances vast tracts have been denuded of soil by the operation of the elements after they lost their timber production. It will be a long and arduous task to reforest many of these tracts, but the Government has taken the first and most important step in reserving them. In the present volume Director Gannett writes the introductory report on the forests of the United States and then follow reports on the Pike's Peak, Plumb Creek and South Platte Reserves, by John G. Jack; on the White River and Battlement Mesa Reserves, by George B. Sudworth, the Flatland Reserve, by H. B. Ayres and the Bitterroots, San Gabriel, San Bernardino and San Jacinto Reserves, by John Leiberg. The second volume is a portfolio containing thirty-nine maps of the various reserves.

COAL OF MICHIGAN: ITS MODE OF OCCURRENCE AND QUALITY. By Prof. Alfred C. Lane, State Geologist. Lansing: Robert Smith Printing Co., State Printers and Binders.

This forms Part II. of Vol. VIII. of the Geological Survey of Michigan, but a small edition has been bound separately for those specially interested in the subject. It contains a map showing the extreme area of the coal series, about 11,000 square miles, confined to the central part of the Lower Peninsula. This map also shows roughly the elevation of the bed rock surface, from which the depth of drift under which the coal measures are buried may be inferred. In the northern part this is very considerable, amounting to hundreds of feet, and proves an almost insuperable bar to exploitation. Sections are also given which show the way in which the coal seams occur. An interesting plate shows how the different methods of expressing or determining heating power correspond to each other.

A large part of the report is occupied with a discussion of analyses and boiler tests. It will be noticed that the author thinks there are at least seven distinct coal horizons, of which three are mined, each having its own characteristic quality, but all being bituminous and generally gas coals. These three he calls the Saginaw and Lower and Upper Verne. We select as characteristic analyses the following:

	Saginaw.	Lower Verne.	Upper Verne.
Moisture	10.67	8.71	9.57
Volatile combustible	33.59	38.45	40.93
Fixed carbon	53.80	41.16	46.13
Ash	1.94	11.68	4.35
Total	100.00	100.00	100.00
Sulphur	1.01	2.72	.98

The general horizon is identified as that of the Pottsville, the Sewanee of Tennessee and Massillon of Ohio. There is an interesting discussion of the prospects of over production, which the author considers possible if the rate of increase in production is kept up and also some figures on the value of coal lands and royalties. The customary royalty appears to be about 8c per ton. A large number of records of drillings in different parts of the State are given. The price of the report is 35c and 11c postage.

BULLETIN NO. XXXIX. OF THE DEPARTMENT OF LABOR. Washington: Government Printing Office.

This issue is devoted to the course of wholesale prices in 1901. The general run of the prices is fairly satisfactory, there being an increase in most of the commodities listed. In many of the cases where a decrease is noted it is due to improved methods of production or to other factors of this nature. It is impossible to give instances in detail of the course of prices except in the case of industries to which this magazine is specially devoted. In American Portland cement the quotations range from $1.90 to $2.10 per barrel in New York on January 1, to $1.70 to $2 on May 1, which price remained stationary during the remainder of the year. This gives an average for the entire year of $1.8896. This is the lowest average price recorded since 1895, the closest approach being the average of $1.9667 for 1897. The highest price reached for Rosendale cement during the year was $1.05 to $1.10 for the three months from March to May. For the following

months of the year the price dropped to 95c to $1.05, the average for the year being $1.0188. This, however, is the highest average for any year during the past decade, the lowest figures being reached in 1897, with an average of $0.7521. For Rockland lime the average was $0.7742, as against the lowest figures for the entire decade, which were $0.6833 in 1900. During the past ten years the price of lime has shown considerable fluctuation, being higher than in 1901 during all of the years, except 1896, 1897, 1898 and 1900.

THE BROOKLYN ENGINEERS' CLUB. Proceedings for 1901. Price $2.

This volume of nearly 150 pages, besides giving the proceedings for 1901, the constitution and by-laws, the list of members, and memoirs of the late Robert Pond Brown and Charles A. Cregin, contains the papers read at the meetings and the discussion of them. Those that have a particular interest for readers of this magazine are: "Practical Sewer Construction," by J. C. Meem; "Telephone Subway and Cable Construction," by F. W. Conn; "Foundation Work and Contractors' Plant, Manhattan Railway Co.'s Power Houses," by F. G. Cudworth, and "The New East River Bridge; An Historical and Descriptive Sketch," by O. F. Nichols. The latter paper, with its full list of the quantities and the various bids, preserves in accessible form important information concerning a great public work.

THE TWENTY-FIRST ANNUAL REPORT OF THE U. S. GEOLOGICAL SURVEY: Charles D. Walcott, Director. Parts II, III and IV. Washington: Government Printing Office.

The second part of the Twenty-first Annual Report is devoted to general and economic geology and Alaska. The geological features of certain portions of Colorado, Wyoming, Nevada and Montana are considered and then follow reports on coal fields in Indian Territory and Southwestern Arkansas. The reports as to Alaska cover the results of reconnaissances of the copper deposits of the upper White and Tanana Rivers and also of the Skolai Mountains and the Chitina, Chandlar and Koyukul Rivers.

Part III has studies of geological features in Connecticut and the Black Hills and then follow reports on the iron ore deposits of the Lake Superior region, the Arkansas bauxite deposits and the Tennessee white phosphate. The last portion of the volume is taken up with one of the most interesting and important of the recent publications of the survey, a report on the Geology of the Philippine Islands, by G. F. Becker.

Part IV is devoted to Hydrography, P. H. Newell, Chief of Division. More than half of the volume deals with the progress of stream measurement during 1899. N. H. Darton gives a preliminary description of the geology and water resources of the southern half of the Black Hills and adjoining regions in South Dakota and Wyoming. Willard D. Johnson writes of the High Plains of the Arid Region and their utilization. All of these volumes are well illustrated and are accompanied by maps.

POWER PLANTS OF THE PACIFIC COAST, by F. A. C. Perrine, D. Sc., New York: New York Electrical Society.

This paper, read before the two hundred and twentieth meeting of the Socity, is issued as Number VII. of the Transactions of the New York Electrical Society. It has an attractive illustrated cover and in its arrangement and typographical appearance it is one of the most artistic technical publications that we have seen. The paper itself is of great interest in showing the marvelous work that has been done on the Pacific Coast in the long distance transmission of electrical power. It is devoted mainly to the plants of the Standard Electric Company and the Bay Counties Power Company of California. The power houses are at Electra, Folsom, Nevada and Colgate, far back in the mountains where tremendous water power has been going to waste for years. This has now been transformed into electrical energy and to the amount of thousands of horse power is transmitted more than 200 miles. There are many beautiful illustrations in the paper.

French Tariff on Whetstone.

A recent revision of the French Customs Tariff, fixes the duty on Turkey stone (pierre du Levant) and Arkansas stone for grinding or sharpening tools. In the rough the stone is admitted free. Worked, cut, polished or shaped, there is a general tariff per 100 kilograms of 20 francs and a minimum tariff per 100 kilograms of 15 francs.

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STONE.

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ALPHABETICAL INDEX TO ADVERTISERS.

TRENTON FALLS GORGE, WEST CANADA CREEK

STONE

VOL. XXIV. NUMBER 5.

SOME WATER POWERS OF NEW YORK STATE.

NEW YORK STATE has done excellent work in the study of its topographical features, of its geological characteristics and resources, and in all of the lines of investigation that properly come within the purview of advanced government. For many years there was at the head of the State Geological Survey one of the greatest palæontologists in the world, one whose name was familiar in every country where this science is under consideration. The State was one of the first to issue a report on economic geology, and the work of Prof. John C. Smock in this line has long been recognized as a model of its kind. Since the Department of Geology has come within the control of the University of the State of New York many admirable and invaluable bulletins have been issued, such as those devoted to "The Mineral Resources," "Road Materials and Road Building," "Petroleum and Natural Gas" and "Clays of New York." In addition to this department, the many reports of the Adirondack Survey and later of the State Land Survey, which succeeded it, have done much to make known the natural wealth and attractiveness of this great forest region. Of late years the reports of the State Engineer and Surveyor have had value for all who are interested in the resources of the State and particularly to the producers of stone. Under the law, the State Engineer and Surveyor is charged with the improvement of highways, and it is due largely to the activity and judgment of the present incumbent of the office that road building in New York has taken a more prominent place than ever before in the history of the State. For years we had to be content to see the wealthiest and one of the most progressive of the commonwealths outstripped in road construction by Massachusetts, New Jersey and other States with only a fraction of the wealth and population of New York. The passage of a measure for State aid in road building, wisely administered by Hon. Edward A. Bond, has done much to awaken general interest in the subject of highway construction. The annual report of the State Engineer and Surveyor for 1901 has just been issued, and this shows some suggestive figures. There have been built, or are now building, 51 macadam roads located in 19 counties, aggregating 134½ miles in length at an average actual cost of $7,955 per mile; also

5 earth roads located in Orange County, aggregating 33.61 miles in length at an average actual cost of $2,134 per mile. Surveys, plans and estimates have been made and accepted, and the counties' half of the estimated cost has been actually appropriated by the Boards of Supervisors for 46 macadam roads located in 12 counties, aggregating 121.66 miles in length, at an average estimated cost of $9,011 per mile; also 4 earth roads located in Orange County, aggregating 21.32 miles in length, at an average estimated cost of $2,293 per mile. Surveys, plans and estimates have been made or are in progress for 79 roads located in 25 counties, aggregating 314 miles in measured length, which will be submitted to the Boards of Supervisors at their coming sessions. Surveys are yet to be made for 76 roads located in 22 counties, aggregating 416 miles in estimated length.

The report contains many interesting particulars with regard to highway construction. Mr. Bond repeats his recommendation of former years that trap rock quarries to furnish the best of road metal should be opened in the immense deposits along the highlands of the Hudson, these quarries to be worked by convict labor. He also takes up the suggestion that the State should issue bonds for $10,000,000, to be expended in the improvement of public highways. This would construct upwards of 1,250 miles of improved macadam road. It would thus be possible to form a continuous road from New York City, by way of Albany, to Buffalo; from Albany to Rouses Point, and from Nyack, in Rockland County, through the southern tier of counties to Mayville, in Chautauqua County, aggregating altogether about 1,090 miles.

One of the most important subjects covered in the report is that which records the measurement of streams and flow of water in New York State. The State Engineer and Surveyor receives many requests for information on this subject, which becomes more important with the growing demand for various water supplies for the great cities and with the increasing desire to develop the many water powers throughout the State. The Legislature of 1900, in view of these facts, appropriated the sum of $1,000 to carry on the work of the measurement of the volume of streams, and the public approval of the results were so general that the further sum of $1,500 was appropriated the next year. With only this modest sum the department was enabled to obtain excellent results, working in co-operation with the United States Geological Survey. A large number of gauging stations were established, many of them at dams and others at bridges. In many cases, however, it was found that the profiles of the dams were irregular, and that near the bridges the regular flow was somewhat disturbed by piers and other obstructions. In some cases (as on the Oswego River, eight miles from Lake Ontario) a fixed wire cable was stretched across the stream well above high water level, and the observer makes meter readings from a car in which he travels upon this cable. It is intended to establish these meter stations upon all streams where it is practicable, and gradually to discontinue the observations at dams where the conditions are unsatisfactory. On many of the streams recent developments in electrical transmission have given an impetus to the construction of substantial masonry dams and power plants,

affording almost ideal conditions for maintaining gauging records. Private individuals and corporations interested often co-operate, and excellent records are in this way obtained with comparatively slight expense. Owing to rapid fall, with frequent rifts, backwater from dams, obstruction by ice, and other characteristics of New York streams, the difficulty of maintaining continuous gauging records which will show with sufficient accuracy the discharge rate day by day throughout the year is very great. This is especially true in streams whose discharge fluctuates between wide limits. The discharge of

STATE DAM AT BALDWINSVILLE, SENECA RIVER.

the lower Mohawk at Rexford Flats and Schenectady, for example, varies from 500 to 55,000 second-feet or more. In such cases methods of gauging applicable at low and ordinary stages may not give equally reliable results during freshets; or the reverse may be true, the results being most accurate for high water.

For mill streams, where the water is held back in pond storage during the dry season, it is impossible to determine the natural regimen of flow of the stream. This is especially true with reference to Sundays or holidays, when mills are not running.

The relation existing between the canals of New York and the streams of the central portion of the State is very implicit. Diversion from the head-waters of a number of streams for the supply of canals virtually reduces their effective drainage areas. As a result, the summer watershed may be materially less in area and differ widely in its water yielding characteristics from the region tributary to the stream when the canals are not in operation. The drainage systems that were measured were the main streams tributary to Lake Ontario, those of the St. Lawrence basin, the Mohawk River and its

tributaries, the Upper Hudson, including Indian and Schroon Rivers, the streams tributary to the Lower Hudson River and Long Island Sound, and the Susquehanna River and its tributary, the Chenango River.

One of the most striking features in these records is the tremendous fluctuation in the flow of all of the streams as shown by these tables. Enough has been said concerning the effects of denuding the lands of forest to bring the matter home to everybody, but the fact is that no one can appreciate the effect of forest destruction on streams until he studies such tables as these. A single instance will be instructive. The observations of the flow of the Hudson River at Mechanicville, Saratoga County, where the drainage area is 4,500 square miles, show the astounding fluctuation from 713 second-feet on September 10, 1900, to 43,546 second-feet on April 23 of the same year. These are but individual instances, and yet the monthly means are almost as surprising. The mean flow for April, 1900, was 22,614 second-feet; the mean flow for September, 1900, was 1,886 second-feet. With all of the tables showing similar variations it becomes apparent that heroic remedies of some kind are needed if we are to preserve our water supplies and water powers. Some attention is being given to the subject of reforestation, but this can only be done in certain localities, and

DAM ON EAST CANADA CREEK, NEAR DOLGEVILLE.

it will be years before any appreciable effect could be noted, even with extensive and systematic forest planting. It would seem as if an elaborate system of dams and storage ponds was necessary.

It is interesting to consider in detail some of the individual gauging stations. One of these was on the Seneca River at the State Dam at Baldwinsville. The upper reaches of the stream are canalized, forming the Cayuga and Seneca Canal, while dams on the lower portion admit of slack

water navigation, forming part of Oswego Canal. During the summer but little water flows over the dam at Baldwinsville. In times of low water the mills are allowed to run only a certain number of hours during the day or until the supply accumulated in the pond above the dam is drawn down

BEARDSLEE FALLS, EAST CANADA CREEK.

to a certain level. The water is diverted through three power canals and conducted to the water wheel by means of short lateral channels. Power is used at ten mills, having a total of over forty water wheels. On the East Canada Creek a gauging station is the masonry dam of the electric light and power company at Dolgeville, Herkimer County. This dam is of rubble masonry, 19 feet high, and has a flat crest six feet in width and 190.25 feet long between abutments. The elevation of the upstream edge of the crest is one foot below that of the lip. The impounded water is conducted to the power house 500 feet below the dam through a wrought iron flume 10 feet in diameter.

Another station on the East Canada Creek is at Beardslee Falls, two miles from the mouth. Here there is a natural descent of 105 feet and two short cascades over calciferous sandstone. The power at the lower falls is at present developed under a head of 57 feet and supplies electric light and power to St. Johnsville, Fort Plain and Nelliston, Canajoharie and Palatine Bridge, and to Ingham's Mills. A masonry dam at the head of the upper fall, eighteen feet in height, has been constructed, which affords a total available head of 120 feet, of which the electrical development is in progress. Blue Falls, between Ingham's Mills and Dolgeville, affords a natural descent of 30 feet and is undeveloped.

At Schoharie Falls on the Scoharie Creek a dam and power plant has

been erected by the Empire State Power Company of Amsterdam, seven miles from that city. The dam is of masonry backed with timber. It has a flat crest one foot in width and a slope on the upstream face of approximately two and a half to one. The crest is 380 feet long. Adjacent to the dam is an overflow, having a crest 60 feet in length. Water is conducted to the power plant through an open earth canal 3,900 feet long.

Esopus Creek has its source in Winnisock Lake on the northwestern slope of Slide Mountain, the highest peak in the Catskill. From Big Indian to Olive Bridge the stream flows through a deep valley flanked on both sides by timber covered mountains. Numerous sites for dams or storage reservoirs are offered at points where the valley broadens out for a short distance to receive the inflowing water of tributaries. The stream channel is relatively broad and shallow. The bed is covered with cobble and small boulders. The descent of the stream is rapid, though not precipitous until Olive Bridge is reached. At this point the stream flows over a rock ledge to a narrow gorge, forming Bishop's Falls. The natural fall is 22 feet and is increased to 28 feet by a timber dam on the crest of the ledge, originally constructed in 1828. High water marks at Olive Bridge just below the falls show that the stream is subject to fluctuations of stage of 30 feet or more in a gorge 100 feet wide.

On Rondout Creek at Honk Falls a natural declivity affords a fall of 125 feet over tilted strata of Hudson River shale. This fall has been increased to 147.5 feet by the construction of a masonry dam at the head of the gorge. The power thus attained is used for the generation of electricity, which is transmitted to Ellenville, a distance of three miles.

One of the most picturesque spots in the State is Trenton Falls gorge, where the West Canada Creek has worn a deep channel through the shales and gravels. At Trenton Falls a concrete dam has been constructed where a head of 265 feet is obtained. This is utilized to generate electrical power to the Utica Electric Light and Power Company. At this point the stream has a drainage area of 375 square miles.

The above descriptions are of merely a few typical dams or water powers scattered through the State. Nearly all of them are capable of a much greater development, and with the progress that is being made in the use of electrical energy it is certain that much of the water in these streams which is now allowed to go to waste in freshets will be impounded and used to generate power. It is well to consider what has already been done in the way of utilizing water powers on some of the principal streams.

On the Moose River there are seven dams, each of which generates from 500 to nearly 2,000 horse-power. This is used for the manufacture of wood pulp and paper. On Black River there are twenty-two dams furnishing roundly 60,000 horse-power to eighty mills along the banks. There are six dams on Salmon River, furnishing power to sixteen mills. The greatest power generated by any one of the dams is 136 horse-power, and the total does not exceed 450 horse-power. On the west branch of Fish Creek there are nine dams operating sixteen mills and furnishing about 1,000 horse-power. This is used for wood working and grist mills. The principal

water powers on Chittenango Creek are furnished by ten dams. There are only five mills operating at present, as a number of them have been abandoned. On Grasse River there are ten dams furnishing power to twenty-four grist, wood working and pulp mills. On Little River there are four dams and four mills. On the Oswegatchie River there are twenty-one dams which give power for fifty mills, and on the West Branch there are five dams which furnish power to five mills, two of which have been abandoned. On Sauquoit Creek the principal developed water powers were furnished by nineteen dams yielding nearly 2,500 horse-power. There are

SCHOHARIE FALLS DAM, SCHOHARIE CREEK.

about an equal number of mills. On the East Canada Creek there are five dams used for the generation of electricity and the operating of grist, felt and saw mills. On Catskill Creek and its tributaries there are nine dams yielding about 500 horse-power. On Esopus Creek there are eleven dams, but several of the mills are not operated. Nineteen dams on Rondout Creek furnish considerable power, although some of it is not utilized at present. On Wallkill River there are ten dams, two of which were abandoned long ago.

Such a list as the above does not take into account some of the most important water powers of the State that have been developed. It is merely an indication of what has been done on some of the small streams and of what can still be accomplished. Stone men should have an interest in the subject, not only because of the demand for stone for dam building, but also because of the desirability of utilizing water power for the operation of their plants. Now that electrical energy is conveyed such a distance from the sources of generation, it should be possible to utilize it in many plants for which it was unavailable hitherto.

THE STONE RESOURCES OF NEWFOUNDLAND.

NEWFOUNDLAND has heretofore attracted attention in the way of its stone resources mainly by its deposits of slate. The quality of this material is declared to be equal to the Welsh product, and a determined effort is being made to exploit the various deposits found in the province. Until very recently little had been done in the way of quarrying stone. Most of the stone produced was used for macadam and paving blocks, and there was some little activity in the gathering of the round beach stones, which are used for rough cobblestone pavements. The recent reports of Prof. James P. Howley, F.G.S., the Director of the Geological Survey, show that the people of the provinces are beginning to take a greater interest in the stone resources, and that some of the native stone is being employed for building operations. The new Court House at St. Johns is built entirely of sandstone from Kelly's Island, Conception Bay, faced with syenite from Mr. Ellis's quarry near Petites, South Coast. These form an excellent contrast, and their durable character is unquestioned. A new wing has recently been added to the Lunatic Asylum, constructed of Signal Hill sandstone. There is a great quantity of similar stone in the hills and ridges in the vicinity of St. Johns, and this has been used in a number of churches and public buildings. It has been used extensively also in such works as retaining walls, foundations and the like. The industry, however, is of a desultory nature, and is only active when some large structure is in the course of erection. A few farmers and others devote a portion of their leisure time each fall and spring to quarrying in the vicinity of their homes, and usually find a ready sale for the small amounts they take out. The Signal Hill stone is of excellent quality for rough work, and a considerable industry could doubtless be built up if quarries were opened and conducted in an enterprising and up-to-date way.

Prof. Howley says that stone fit for building, structural and ornamental purposes is abundant in many parts of the island. Sandstones of many colors and various degrees of texture are very common in the Lower Carboniferous series of Codroy and Bay St. George districts. Limestones also abound in the same region, some of which would make handsome marbles, while others are adapted for burning into lime. Serpentine of many varieties and great beauty are met among the magnesian group or metamorphic series, wherever the latter attain any considerable development. A very beautiful green variety of an attractive appearance admirably suited for ornamental purposes comes from Tilt Cove in the vicinity of the copper mines. Many varieties of soapstone exist in connection with the serpentine deposits, and beautiful ornamental stones may be encountered in various parts of the country, such as red, yellow and variegated jaspers, amethystine and opalescent quartzite, handsome porphyries, syenites, traps and amygda-

loids and a variety of other rocks too numerous to specify. Many of these have been cut and polished and set in jewelry.

With regard to slate Prof. Howley says: "The operations at the Wilton Grove slate quarry in Smith's Sound were actively prosecuted during the year, resulting in a large increase in the manufacture and exportation of roofing slate. The output was about 2,000 tons, equal to 6,000 squares, valued at $22,500. The slate is made in two sizes, 20x10 and 24x12. It all went to the English markets, the former to Newcastle, the latter to

BISHOP'S FALLS ON ESOPUS CREEK.

London, where a ready sale at remunerative prices was paid for it. This quarry is now a well established industry. I paid it a visit last autumn, and was surprised at the work being accomplished. A fine pier was in course of construction along the water front, being filled in with the waste from the slate. Vessels of almost any size could lay alongside within a stone's throw of the quarry, and in perfect safety. A large space immediately in the rear is used for storage purposes, where a splendid display of slate lay piled in tiers awaiting shipment. About 50 men were busily engaged with Ingersoll steam drills quarrying huge slabs from the cliff. These were swung by derricks on to trolleys in waiting and quickly moved to the sheds, where a number of Welsh slaters were busy cleaving and dressing the material into the required dimensions for roofing purposes.

"So far no attempt has been made to manufacture any of the other articles for which this slate is equally well adapted, but I understand the plant requisite for such purposes is soon to be installed.

"The slate is of various shades of color, dark purple prevailing, but there is also a band of pale sea-green of beautiful texture. The quarry is

of immense proportions, and there is sufficient material in sight to last for generations.

"Several new deposits have been located within the past season similar in geological age to that of the Smith's Sound quarry. Some of the large Welsh firms are beginning to take an interest in the possibilities of this country as a slate producer, little, if anything, inferior to their own. One of these firms informs me that our slate is much superior to any imported into Great Britain from foreign countries. They add that 'there is a great future for slate in Newfoundland.' "

Aside from the slate quarries at Smith's Sound there are other deposits of slate in the neighborhood that will well repay development. There is a tract at Keels, Bonavista Bay, controlled by a gentleman in New York, which was worked in small way some years ago. Samples of slate from this property are now in the office of STONE magazine, and it can be seen that they are excellent in color, quality and cleavage. The vein faces the water, running half a mile or more along the shore. It goes inland about the same distance. At certain seasons when the weather is favorable boats could be loaded in a cove on the property. When this would not be available there is a good harbor but a short distance away. The slate is of the true Welsh purple, and there is plenty of the unfading green. It is undoubtedly the same vein that is found at Smith's Sound. This would have certain advantages that are not to be found at the latter place. Close to the quarry is the small fishing village of Keels, with 200 or 300 inhabitants. Five miles away and connected by a good road is the seaport town of Kings Cove. The absence of any settlement near Smith's Sound makes it difficult to keep the quarrymen at work longer than two or three months. The Keels quarry could also be worked very economically. The top is only five to ten feet, and some good slate could be taken from this. The joints are regular, so that blocks could be taken out easily. There would be little expense in removing the waste, as the sea would carry much of it away. This property has been brought to the attention of slate men in England, and it is probable that it will be fully developed before many months. The Newfoundland slate is very popular in England, and there is no difficulty in selling it, even in competition with the Welsh product.

Prof. Howley reports that the Reid Newfoundland Company vigorously prosecuted work at their granite quarry near the Topsails during the greater part of the summer of 1901. Much of the material raised was utilized in bridge construction, and a large amount was dressed for a new railroad station to be erected at Riverhead. They also manufactured 140,000 paving blocks.

Among the resources of the province that Prof. Howley thinks would well repay development are gypsum, asbestos and mica. In the district of Bay St. George there are immense deposits of gypsum. Between the years 1891 and 1894 a considerable amount was exported from this locality to the United States, but since then the fields have remained unproductive. In Canada the gypsum industry has attained to large proportions. Asbestos and mica are known to exist in large quantities on the Labrador and in the

Island of Newfoundland. Much of the short fibre asbestos could be used for plastering purposes, this material, under the name asbestic, being very popular in the Canadian provinces. Mr. Howley says: "From what we know of our Labrador territory there would appear to be in that region room for a vast mica industry in the near future. It is certain that the country possesses an abundance of the material of large size and superior quality, nor is the Island of Newfoundland itself destitute of some good mica."

CARE IN THE STORAGE OF MARBLE.

MANY years ago, long before I thought I should have any interest in the stone business, I had occasion to buy a variety of fancy woods. I needed tropical woods like mahogany, rosewood, coccobola, satin and tulip woods. In those days such varieties of wood were not easily obtained. I finally heard of a sawmill in a little village a number of miles from my home, where, I was told, I could obtain what I was seeking. With very little hope of success I made a visit to the mill. I shall never forget my impressions of it. It was a small and unpretentious structure embowered in trees. It was neat and well kept and bore a general

HONK FALLS, RONDOUT CREEK.

air of prosperity. When I entered and examined the stock, I found that the interior and the business methods that ruled were in keeping with the exterior. As soon as a log was sawed the pieces were neatly piled together, just as they lay in the log. As the sawdust had a commercial value, it was frequently gathered into bins. There was a minimum of waste, and no refuse lay about under the feet of the workmen. Everything was as neat and orderly as a

typical New England kitchen. The entire stock could be examined with very little trouble, and it was very easy to get matched patterns in the wood.

It is years since I have seen the mill, but in an indirect way I have frequently heard from it. A second generation is now in charge of its destinies. It has made no great fortune for its owner, but has given satisfactory returns. The lesson of the mill has always been with me, and I cannot say how often I have thought of it and sighed with regret as my business has led me through the marble yards. There is no apparent reason why the same general methods that obtain in this saw-mill should not be followed in the marble yard. That the same care and foresight cannot be found in one marble yard out of a thousand every stone man is aware. The similarity between the wood and the marble is more striking than the differences. In both it is desirable to keep the slabs assembled in the order in which they are cut, in order that the patterns may readily be matched. The wood sawyer knows that if he exposes his stock to the elements, even for a brief time, it will be hopelessly ruined. The marble man is aware that many of the most costly varieties of his stone will be affected by the frosts, but still he will stack his slabs in the open air and trust that they will be off his hands before they have noticeably deteriorated. The only excuse that can be advanced for the marble man is that his stock is cumbersome and difficult to handle. Against this, however, must be considered the fact that by lack of care at the outset it is often necessary to handle stock two or three times over needlessly. There are often direct losses that must be taken into account. To say nothing of stone that is broken by the frost, many dealers will sell a delicate marble at figures they realize are not the most favorable, because they fear to carry it over in their open air yards. How often large slabs are cut up for a hurry order, simply because it is impossible to go through the entire stock for slabs of the required size, I would not venture to say.

With all of these points so often brought to the attention of the marble men, it is strange that more attempts are not made to overcome the difficulties. There are doubtless many yards that are carefully constructed and well managed, and a fair proportion of them keep their valuable marbles under some sort of shelter. During all my experience, however, I have seen only one that seemed deserving of description as a model yard. This belongs to one of the leading firms in the trade. The marble is stored in a large and admirably arranged building that is kept constantly at an equable temperature by steam throughout the winter. The marble is all carefully assorted according to size, and matched slabs are, of course, kept together. What all of this means in a business way it is difficult to estimate in dollars and cents. I realize that it is impossible for most of the small yards to follow any elaborate system like this, but there is scarcely one where it would not be possible, as well as highly desirable, to give greater care to the storage of marble.

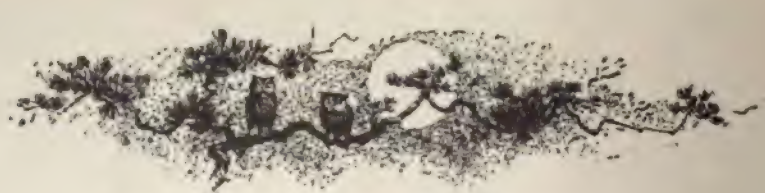
A few instances bearing on this general subject that come to mind may not be amiss. In one of the large yards stood a block of green marble. It was not needed at the time, and it lay exposed through a very severe winter. In the spring there was need for it, and it was found split to pieces by the

A TYPICAL STONE YARD.

frost. Of course, the block was not sound, but if it had not been shattered it could have been used for the purpose desired by backing up the slabs after sawing. Another firm had a large block of the finest imported marble. This was bought years ago, when this particular variety was not as scarce as at present and when prices were low. A short time ago a firm of marble workers had occasion to use some of this marble in a hurry job. They went all over the city, but could not find another block save this. They offered the full market rate for it, but the owners refused to sell save at a very stiff advance, a price that represented at least three times the original cost of the block. The would-be purchaser laughed at the demands and tried once more to secure the desired stone. There was absolutely none to be had, and finally this block was bought, but at a slight advance from the first figure asked. If the block had been treated like most of the marble and kept in the open air it would have been absolutely worthless during the fifteen years that had elapsed since its original purchase. Of course, it would not have been kept in this way, but would probably have been sold at cost price when it was found that it was not immediately needed. The profit made on this one block would pay for the careful storage of thousands of feet of marble.

I have said that the firm that has the model yard is a leading one in the business. I am confident that the growth of its business is in no small part due to the care with which they store and handle their stock. They know exactly what they have on hand, and they can show it to an intending purchaser without a moment's delay. All of this counts for much, and if the smaller yards would follow this excellent example as closely as possible, would classify and arrange their stock and would shelter the delicate marbles so that they could carry them through winter after winter without fear of deterioration, I am sure that they would find their earnings increased. Those who have done me the honor to read my papers month by month will remember that I have always held that stone dealers are apt to give too little consideration to the life of the stone. It may be shattered by blasting, by rough handling or by the weather, but the dealer thinks he is free from blame if the stone goes from his hands apparently sound, so far as a casual inspection shows. It does not seem too much to ask that in the mere storage of the stone, while it is awaiting a purchaser or the workman, it should be treated with the same amount of care and consideration that is bestowed by other tradesmen upon their wares.

GEORGE BARNUM.



ABRASIVE MATERIALS IN THE UNITED STATES.*

ABRASIVE materials are, as a whole, but little understood, although they are in one sense among the most important of the mineral products. The principal abrasives fall into three general groups: those which occur as rock formations, and are cut and manufactured directly into the form desired, while retaining their original rock structure and appearance, as grindstones, whetstones, etc.; those which occur as a constituent of either a rock or a vein, and have to be mechanically separated and cleaned, as corundum, emery and garnet; artificial abrasives, as carborundum, crushed steel and artificial corundum.

The use of abrasives is growing with the increase of our manufacturing industries. The total value of natural abrasives produced in the United States in 1901 was $1,194,572, as compared with $1,208,073 for 1900.

In the United States, rocks suitable for making whetstones are found in nearly all the States east of the Mississippi, and in a number of those to the west of that river; but the supply is obtained from Arkansas, Indiana, Ohio, New York, Vermont and New Hampshire.

The Arkansas whetstone quarries are in Garland and Saline Counties—the principal ones being on Quarry or Whetstone Mountain, near Hot Springs, Garland County. The sandstones of Orange County, Indiana, furnish a whetstone known as the Hindostan or Orange stone, which is quarried in Frenchlick and Northwest townships. In Kentucky the Caron Stone Company is quarrying to a limited extent a waterhone from Hardin County. In Ohio, at Berea, Euclid and Chagrin Falls, in Cuyahoga County, and at Grafton in Lorain County, whetstones and oilstones are produced. In Cortlandt County, near Labrador Lake, in New York, the Labrador stone is quarried for whetstones. In Haverhill Township, Grafton County, New Hampshire, and near Lamoille, Orleans County, Vermont, are three quarries for the celebrated Indian Pond, White Mountain and Lamoille scythestones. The production of oilstones, whetstones, etc., in 1901 amounted to $158,300; the imports were valued at $64,655, and the exports were in excess of the imports.

The production of grindstones in the United States is almost entirely from Ohio and Michigan. The principal grindstone district in Ohio is included in Lorain, Cuyahoga and Summit Counties, with Cleveland as a center, the largest grindstone quarries and manufacturing plants being within twenty-five miles of Cleveland. The quarries in southern Ohio are along the Ohio River, west of Marietta, and inland northwest of that city. A few quarries are in West Virginia across the river from Marietta. The Michigan quarries are on the shores of Lake Huron, about ninety miles north of Port Huron, near Grindstone City. In South Dakota are located the quarries of the Edgemont Stone Company, near Edgemont, on the line of the Burlington and Missouri River Railway.

Since paper began to be manufactured from wheat pulp there has been a demand for a stone suited to the grinding of wheat to a pulp. The main

*From advance sheets of "Mineral Resources of the United States, 1901."

supply of pulpstones has been imported from Newcastle-upon-Tyne, England. Various attempts to find a stone in this country suitable to this purpose have been made; and the stones from the new quarries of the Tippecanoe Pulp and Grindstone Company, at Empire, Ohio, has proved to be well adapted to the manufacture of pulps. In 1901 there was a very large increase in the production of pulpstones over that of any previous year, the total production amounting to 860 tons, valued at $18,800, as compared with 553 tons, valued at $12,495, produced in 1901, and with 288 tons, valued at $8,712 in 1899.

The total value of the production of all kinds of grindstones in 1901 was $580,703, a decrease of $129,323 from the production of 1900, which was $710,026.

Grindstones continue to be imported into the United States, and they come from Newcastle-upon-Tyne, in England, from Edinburgh, Scotland, and from Bavaria. The imports in 1901 amounted to $88,871, as compared with $92,581 in 1900.

The total export of grindstones from this country is now greater than the import.

Millstones are found in various localities in the United States. The New York millstone quarries are located in a belt of sandstone and conglomerate on the Shawangunk Mountains, extending across the towns of Rochester, Marbletown, Wararsing, Gardener, New Paltz, in Ulster County, and the product is known as "Esopus" stone. In Pennsylvania the quarries are located in Lancaster County, and the millstones are known as "Turkey Hill" and "Cocalico," the former being found on Turkey Hill, near Bowmansville, and the other near Durlach and Lincoln. In Virginia quarries have been opened on Brush Mountain, in the vicinity of Price's Fork, Montgomery County, and the stone is known as the "Brush Mountain" stone. The places just mentioned were the only ones at which millstones were quarried during 1901, and there was an increasing production from each of them. Millstones were formerly obtained from Moore County, North Carolina, and from the Berea Grit, at Peninsula, Ohio.

A good many buhrstones are still imported from France, Belgium and Germany, and they are considered more satisfactory than the American stones. The production of millstones in 1901 amounted to $57,179, as compared with $32,858 in 1900 and with $28,115 in 1899. The value of the imports of millstones and buhrstones in 1901 was $42,187, as compared with $28,904 in 1900.

During the summer of 1897 several extensive deposits of pumice were discovered in Nebraska, the most extensive being in Sioux, Dawes, Scott's Bluff, Banner and Cheyenne Counties. Another deposit was discovered in South Dakota, about three miles east of Pine Ridge Agency. The volcanic ash of which these deposits were composed was probably brought by the winds from volcanoes in Colorado and New Mexico, and deposited in the lakes and other water courses which at that time covered this region. A deposit of lump pumice stone has been found in Millard County, Utah, and is the only known deposit of lump pumice stone in the United States.

A large deposit of pumice is reported as occurring in Sonoma County, California. On account of the distance of these deposits from the railroad and from the large markets, they have not been able to compete with the pumice imported from Lipari, Sicily, which is shipped as ballast and sells in New York, after being ground and bolted, at from 2 to 2½ cents per pound. No record of the pumice imported into the United States is kept, but it is estimated as being between $45,000 and $65,000 a year.

Large deposits of infusorial earth or tripoli have been found in Maine, New Hampshire, Massachusetts, Connecticut, New Jersey, Maryland, Virginia, Georgia, Alabama, Arkansas, Nevada and California, and a porous siliceous rock in Carthage, Newton County, Missouri, is included, as it is used for the same purpose as the infusorial earth. Perhaps the largest and most noted of infusorial earth deposits are those at Niederohe and Oberohe, in North Germany. The infusorial earths are included with the abrasives because they are used in manufacturing polishing powders and scouring soaps. Infusorial earth has been found also to make an excellent absorbent for the manufacture of dynamite and nitroglycerin; its non-conductivity of heat gives it value for packing for boilers, steam pipes and safes, and it is also being used considerably in the manufacture of fireproof building materials. The production of 1901 amounted to 4,020 short tons, valued at $52,950, as compared with 3,615 tons, valued at $24,207 in 1900. This increase in value is partly due to the large production of the American Tripoli Company of Seneca, Missouri.

Crystalline quartz is used principally as a wood finisher, and the entire production of this material for this purpose is accredited to Connecticut. Crystalline quartz is used also as an abrasive in the stone cutting trade, and a small amount of quartz is crushed and sized and used in the manufacture of sandpaper. The production of crystalline quartz in 1901 was 14,050 short tons, valued at $41,500, as compared with 14,461 tons, valued at $40,705 in 1900. These values are for the crude quartz; after it has been prepared for market its value is from three to four times as great.

At the present time garnet is obtained in four States—New York, Connecticut, Pennsylvania and North Carolina. In New York the garnet is obtained from near North Creek and Minerva, in Warren County, in the valley of the Upper Hudson River, and in Essex County. In Connecticut garnet is found near Roxbury, Litchfield County. The Pennsylvania localities are at Chester Heights, in Chester County, and also in Delaware County. Garnet deposits have been worked at a number of localities in North Carolina with considerable success. These deposits are all in Jackson County, one, the Sugar Loaf mine, is near the summit of Sugar Loaf Mountain, a mile and a half from Hall; another, the Savannah mine, is on Cowee Mountain, near the head of Betty Creek; a third, the Presley mine, is near Speedwell, in the Upper Tuckasegee Valley. There is a large deposit of massive garnet in Mitchell County, about five miles from Spruce Pine. There are bands of corundum and garnet-bearing quartz-schist in the southern part of Clay County and the northern part of Rabun County, Georgia, on the slopes of Scaly Mountain, which a Philadelphia company is now working

for corundum with garnet as a by-product. A good quality of rich red garnet in crystals an inch or more in diameter is found in Alaska, near Fort Wrangell, at the mouth of the Stikine River.

Most of the garnet mined is used in the manufacture of sandpaper or "garnet paper," which is extensively employed for abrasive purposes, especially in the manufacture of boots and shoes. Practically all the garnet produced in North Carolina is manufactured into wheels, which are sold as emery wheels. The production for 1901, as reported to the Survey, is 4,444 short tons, valued at $158,100, as compared with 3,185 tons, valued at $123,475, in 1900. The average value per ton of the garnet produced in 1901 was $35.57, as compared with $38.76, the value per ton in 1900.

Under corundum are included the three varieties—sapphires, corundum and emery—the last two being the varieties used in the arts for abrasive purposes. Next to the diamond, corundum is the hardest mineral known, and the blue sapphire is the hardest variety of corundum known. Corundum occurs in a narrow belt extending from Tallapoosa County in Eastern Central Alabama, to Trenton, New Jersey, and also along the same line in New York, Connecticut, Massachusetts, New Hampshire and Maine. The Corundum Hill mine, which was the only producer in 1901 of corundum from deposits occurring in this belt, is located about eight miles southeast of Franklin, Macon County, North Carolina. Corundum is known to occur in many other localities in the Eastern States. Within the last few years a deposit of corundum of a commercial quantity for abrasive purposes has been found in the south central part of Gallatin County, Montana, on the headwaters of the Elk Creek; and it is expected that this Montana corundum will be placed on the market before the close of 1902. A discovery of corundum has recently been made in Plumas County, California, about one and one-half miles northwest of Meadow Valley post office. In Fremont County, Colorado, also about seven miles from Canyon, the nearest railroad station, another interesting occurrence of corundum has recently been found. In addition to the deposits of corundum mined for abrasive purposes in the United States, it is now also mined in the province of Ontario, Canada; in the Salem district of the province of Upper Burmah, India, on the Island of Naxos, in the Grecian Archipelago, and in the vicinity of Smyrna and Kulah, in Turkey.

Corundum and emery are put upon the market in the three forms—as grains of powder, as emery paper and as wheels and blocks of various shapes and sizes. The total amount of emery and corundum produced in the United States in 1901 was 4,305 short tons, valued at $146,040, as compared with 4,305 short tons, valued at $102,715, in 1900.

The imports of emery into the United States in 1901 amounted to $294,999, as compared with $239,596 in 1900.

The experiments in producing artificial abrasives that have been in progress during the last fifteen years have met with success, and there are now three artificial abrasives on the market—carborundum, crushed steel and artificial corundum. Carborundum is produced by the Carborundum Company at Niagara Falls, and in 1901 the total production of carborundum

was 3,838,175 pounds, valued at from 8 to 10 cents per pound, as compared with 2,401,000 pounds in 1900. Carborundum is now used to a certain extent as a general abrasive. Crushed steel is used in the stone cutting trade, particularly by the marble and granite cutters. The production of crushed steel by the Pittsburg Crushed Steel Company in 1901 amounted to 690,000 pounds, being 10,000 pounds less than the production of 1900. A new industry has been started in the manufacture of artificial corundum. The Norton Emery Wheel Company has erected a plant at Niagara Falls for the manufacture of artificial corundum, and already two or three carloads of the material have been manufactured and made into wheels, etc., which are reported as giving good satisfaction.

JOSEPH HYDE PRATT.

THE USE OF BASALT IN MASONRY.

THE name "basalt" is a very ancient term, the origin of which has not been exactly settled. The various explanations of its etymology are interesting, but not convincing. Some students have regarded the word as a corruption of "basanites," which was used by Pliny, although it is not certain to what rock he applied it. The black touchstone or Lydian stone, which was used by the ancient jewelers, had a Greek name similar to this last form. Other writers have held that it took its origin from Basan or Bashan, the kingdom of Og, mentioned in the Old Testament. Pliny also used the Ethiopian word "basal" for an iron-bearing rock. The word got its present signification in the sixteenth century. In its more restricted sense it is employed as a rock name for porphyritic and felsitic rocks, consisting of augite, olivine and plagioclase with varying amounts of a glassy base which may entirely disappear. In its broader sense the basalt or basaltic group is applied to all of the direct basic volcanic rocks, such as the true basalts; the nepheline, leucite and melilite-basalts; the augitites and the limburgites; the diabases and melaphyres. This is a large and important group which is widely distributed in this country. Basaltic rocks are found along the New England sea coast, in the Adirondacks and the White Mountains, the Highlands of New York and New Jersey, in the coal and copper regions of Lake Superior, in Colorado, New Mexico, Arizona and Texas, and in many other States. The most important of all the basaltic areas in America is in the Snake River region of Southern Idaho, stretching across into Eastern Oregon and Washington. There are many thousands of square miles covered with dark lava and known locally as the "lava beds." Owing to the peculiar columnar formation in which they are frequently found, the basaltic rocks often play a prominent part in landscape sculpture, which gives them great popular interest. Such are the Palisades of the Hudson and the headlands of Thunder Bay on Lake Huron, the Giant's Causeway in Ireland and the columnar cliffs along the Rhine. In their economical aspects, the basaltic rocks of this country have been used to a limited extent only for structural purposes, but have been largely employed

for paving and roadmaking. In New York and New Jersey they form the best and most important supply of road metal. The color of the basalts unfits them for most structural work, although they would be suitable for much of the heavy masonry.

In foreign countries, while the most important use is still for broken stone, some of the basalts have been employed to a considerable extent in engineering work. This is particularly true of the Rhine basalts and of the basalt lava of Volvic, a village and commune of France in the department of Puy-de-Dome. At the latter place there are large quarries that have been worked for many years. They supply building material for all of the neighboring towns. Owing to its dark tint it gives a very sombre effect to the architecture of the department. The stone is also employed for paving purposes in Paris, and because it is acid proof it is used in the chemical arts. The lava of Volvic is a hard stone, blackish gray in color, and very complex in composition, with a base of silicate of alumina. The difficulty in quarrying the stone is that it has no strata such as are found in sedimentary rock, but in place of these are found irregular fissures due to the presence of gas when the rock was deposited. The stone is very hard, but the workmen by long practice have obtained great facility in hewing it into shape despite the total absence of all planes of cleavage. The stone is also sawed into large slabs which are enameled for certain purposes. For all constructional purposes, however, the basalt which is most largely used is that which comes from the banks of the Rhine, largely in the neighborhood of Linz. This is the columnar formation, but it is different from much of the basalt of this nature in that it is not all cut up by cross joints, as is the case with much of the columnar basalt in America. In some of the Rhine quarries the prismatic jointing is almost perfect, and in the Willsheiderburg quarry, in particular, perfect columns of basalt 100 feet in length, without a single break, are found. Many of these quarries have been worked for years without any sign of exhaustion, and are doubtless capable of supplying the demands for years to come. Columnar basalt is found on the east side of the Rhine, while on the west the rock has a scoriaceous or vesicular form and is technically called basalt lava. The latter is largely used for paving blocks. It is fit for this purpose from the fact that it has a clean, straight fracture. It is also claimed that, owing to its vesicular formation, it is impossible for it to become smooth and polished.

Those who have examined the columnar basalt are aware that the prisms are almost perfect hexagons. This formation is in accordance with the natural law of the economy of energy, a striking illustration of the same principal being found in the honeycomb of the bee. In the use of the stone for structural purposes the hexagonal form is preserved, permitting close joints to be made in the setting of the stone and the use of a minimum amount of cement. The stone has been largely used in engineering works, particularly in the form of sea walls and embankments. Along the shores of the Rhine between Cologne and Bonne is a double embankment built of basalt blocks. Between the upper and the lower embankment is a broad paved driveway. The coping stone on the lower embankment is of the basalt lava,

and the same material has been employed in some of the structures along the bank of the river. The stone has also been used in the improved system of dykes which protect Holland from the irruption of the North Sea and for dock work in Holland. When the Dutch engineers build upon a natural foundation of loose sand and shells, they first sink large willow mats. For this purpose huge irregular masses of the basalt such as are occasionally found are used, and these have obtained from this employment the name of "sink stones." Upon this foundation the remainder of the structure is built of the columnar basalt.

A number of the Rhine quarries at Lintz are being worked by the London Basalt Stone Company, Ltd., which has introduced the work in England for sea walls and similar work. It is to be expected that the introduction of a foreign stone into Great Britain would awaken bitter opposition among the British quarrymen. The first attack on the Rhenish basalt comes from a contract that the company entered into with the municipality of Blackpool. The stone has been supplied for the erection of a sea wall in that town. A correspondent of the "Master Builders' Associations Journal" gives the following account of the controversy that has arisen from this job:

"There has been a vast amount of controversy about the Rhenish basalt supplied to the Blackpool municipality for the sea front of that town. On the one hand the municipal authorities take credit to themselves that they got behind 'a combine which was keeping up prices,' and are making a saving of £4,000 on a purchase of 10,000 tons of stone. The Borough Surveyor for Blackpool says he is perfectly satisfied with the stone, and that it is quite as good in quality as that previously supplied to the municipality. On the other hand, reports have been made public from experts who condemn the stone in wholesale fashion. The Water Engineer of Hastings in round set terms says that 25 per cent. of it is 'quite rotten,' another 25 per cent. is 'not good quality,' while the remainder is 'inferior.'

"Other experts, although not so sweeping in their condemnation, are quite positive that the stone is inferior. The City Engineer for Norwich thinks that one-fourth of it is entirely unsuitable, while the Borough Engineer of Southend is of opinion that 50 per cent. of it is 'good, sound basalt.' The remainder, however, he describes as 'bastard basalt,' which is liable to disintegration on exposure to the action of the water and the sun. This evidently is a case in which experts differ, and differ very widely, and the matter will have to be left to the test of practical experience. It will be very interesting to trace the history of the Blackpool works. It has sometimes happened that municipal authorities have not always taken the wisest course in the interests of ratepayers, when they have been over-anxious to accept what appears to be a low estimate.

"In any case we may expect a protest against the statement made by a Blackpool alderman that Irish basalt was useless for the purpose, and that it was only from German quarries they could get stone suitable for the work. But it is to be hoped that a better reason for the encouragement of an Irish industry will be given than that which was recently suggested by an Irish

newspaper in explanation of the preference shown in that country for Welsh in place of Irish slates. The paper in question solemnly asserted that it was usual in the building trade in case of a contract for every one to be 'tipped,' from the architect to the slater, from the contractor to the shop assistant,' and that 'in England it is usual for the architect or contractor in preparing their estimates to add 20 or 25 per cent. for the above items. 'Who shall assure us,' says the sapient writer, 'that we are more fortunate in Ireland?' "

For the particulars concerning the Rhine quarries and the use of the stone in Germany we are indebted to a recent number of "The Quarry," which has an interesting article on the development of the basalt industry, illustrated with views of the quarries and of the engineering work in which the stone has been employed. The use of the columnar basalt for structural work in America does not seem to have a very great future, because it is too much broken by cross joints. Aside from this fact we have made such improvements in quarrying methods that we are enabled to get stone from solid beds at a reasonable price without depending upon nature to break it up into blocks ready for use.

THE STONE RESOURCES OF UTAH.

UTAH is one of the States in which a rapid development may be expected. A determined effort is being made to increase its railroad facilities, and when this is done its magnificent stone resources can be brought to the market. Owing to its lack of suitable transportation, the stone industry of the State has not assumed any great importance as yet, although excellent work has been done by the pioneers, and the future is rich in promise. No figures for the stone production later than 1900 are available, but these show that the total stone output for that year was valued at $81,652. More than three-quarters of this was in the output of sandstone. The other branches of stone production are being pushed, and there is a chance for excellent success with some products that are entirely novel. One of these is a red tufa of most beautiful color and appearance. This weighs but eighty pounds to the square foot. It has a peculiar texture. An ordinary nail can easily be driven into it, but can scarcely be withdrawn. A sample of this tufa has been shown to New York architects, who are enthusiastic concerning its appearance and believe that considerable use could be made of it in building and decorative work. Another novelty is a white pumice, which when dressed looks like the patent fireproofing so largely used in modern construction. This is so light that it floats and it cuts very readily. It would seem to be a natural fireproofing material. Still a third novelty, but one which can only have a local use because of its great weight, is a dark lava. This breaks readily, so that there will be no difficulty in manufacturing it into paving blocks if it is found suitable for the purpose.

There is another attractive stone in Utah that it is hoped can be put upon the market before long. This is a gray syenite of excellent quality and

fine, rich coloring. It makes an admirable building material, either rock-faced, tooled or polished. Specimens of these stones can be seen in the office of this magazine. It is hoped to develop the properties as soon as railroads now in contemplation are built.

There are more than a dozen quarries producing sandstone in Utah. The production of this stone in the State for 1900 was valued at $66,733. Since then, however, considerable progress has been made in this branch of trade. The stone is of good quality and is found in various attractive colors. It is being shipped and used for building purposes as far west as the Pacific coast. One of the companies that is sending out considerable quantities of stone is the Potter Gray Sandstone Company, whose quarries are on the line of the Rio Grande Railway, near Kyune. The Diamond, Kyune and Castle Stone Company, which is now controlled by Messrs. M. H. Walker and J. R. Walker, are opening quarries not far from those of the Potter Company at Kyune. This company produces gray, red and salmon colored stone of a very fine quality for building purposes.

John H. Bott & Sons quarry a fine grade of sandstone at Brigham City and also do general stone contracting. At Nephi the Nebo Brownstone Company has its quarries, where it produces a valuable brownstone for building purposes. In addition to these places there is more or less stone production at Cedar City, where the Adams and Williams quarries are located, at Manti, Park City, Provo, Salem and St. George. The new post office at Salt Lake City is to be constructed of the native gray sandstone, and the Utah stone has recently met with great success in Boise City. It is said that the stone can be laid down in that city at the same price that rules for the Idaho stone and that it works easier and is more attractive in appearance than the latter stone.

Utah's production of granite was valued at only about $2,000 in 1900, but there is plenty of this stone in the State, and it will doubtless be developed as the demand for it warrants. There are granite quarries already in existence at Alpine, Draper, Ogden, Salt Lake City, Sandy and Wasatch. Next in importance to the sandstone is the limestone production, which had a value in 1900 of $12,749. The centers of this industry are at Cedar City, Ephraim, Manti, Ogden, Riverton and Salt Lake City.

Although in the last Government reports that have been compiled Utah is not credited with any marble production, yet it is known that there are deposits of most attractive marble in the State, and these are gradually being developed. The most attractive varieties of onyx marble are also known to exist, and with the increase of railroad facilities these will soon be worked. There is an extensive deposit west of Utah Lake in which the predominating color of the onyx is orange, although green, pink, lemon and other shades are procured. An onyx belt runs through Millard, Beaver and Iron counties in connection with the hot springs that mark this territory. This stone is very rich in color, ranging through lemon, orange, mahogany and black.

One of the largest and most valuable of these onyx marble deposits is in the hands of a company which lacks sufficient capital to develop the

quarries in a suitable way and has therefore decided to offer them for sale. The property consists of forty-three quarter sections of land containing, as far as known, eight large veins of the travertine. One vein five feet wide stands nearly perpendicular and extends over the mountain a little over half a mile. The second vein is sixteen feet wide and two and a half long; the third vein is three and a half feet wide and one and a half miles long; the fourth is about ten feet wide and a mile long; the fifth, four feet wide and three-quarters of a mile long; the sixth, eight feet wide and one mile long. The seventh and eighth veins vary in width and are somewhat covered. They have not been sufficiently explored as yet to determine their width and extent. All of the veins except the first show pure white. This has the same purity of appearance as the highest grade of statuary marble known, but it excels it, of course, in translucence and fineness of texture. Number 1 vein contains an unusually beautiful variegated onyx. It is impossible to give an idea of this by description. It resembles a shell cameo more than anything else. The colors are white, pale amber and salmon.

This onyx property is situated in Juab County, four and a half miles west of Nephi. The claims lie in one body in a strip two miles wide. There is easy access to all of the claims on the property by wagon road without any grading whatever. In some places the wagon road is very steep, but the grade could be lessened by doing a small amount of grading. Railroad tracks could be brought right up to the quarry, and the entire distance with the exception of half a mile would be almost level. The length of the railroad spur necessary to reach the property would be about four and a half miles. There is no running water on the entire tract. On one of the extreme southern locations there is a spring that would, if properly cleaned out and cared for, supply the necessary water for culinary purposes, the running of steam engines, etc. There is no water upon the premises anywhere that would furnish power. However there is plenty of water on the opposite side of the valley, a distance of five or six miles, which could be used for the development of electrical power, and in that manner be transmitted to the quarries. The mountains through which the veins run are not very precipitous, and are not very much broken up. Wagons have been drawn over and on top of the range at almost every point without any very great difficulty. The only timber on the property is scrub pine, of which there is a considerable amount. This would be suitable for fuel purposes. The entire section of the country abounds in saltpetre, gypsum, salt and similar material. Large quantities of stalagmites and stalactites are found.

Full particulars of the deposit can be learned at the office of this magazine, where samples of the onyx can be seen. The stone has a warmth of color that is entirely lacking in the ordinary onyx, where the body color resembles nothing so much as clear starch or alabaster. This has more the effect of marble than of the ordinary travertine.

ANCIENT SEPULCHRAL MONUMENTS.

IN a study of the history of mankind nothing plays a more important part than the rites and ceremonials of religion, and what is closely connected therewith, of the burial of the dead. It is these which bring us into the most intimate relations with the inner life of the peoples of the past. Great structures that were connected with worship or burial are the sole memorials that remain to us of many races of antiquity, like the huge menhirs, cromlechs and dolmens of the Druids, or those strange creations of the Mound Builders of America. Pagan or Christian, the altars at which they worshipped and the memorials they erected to their dead give us the measure of enlightenment to which any people attained. The study of these remains appeals to us on the side of comparative religion, ethnology and art, and they form the very foundation and ground work of history. Egypt and Greece easily take the foremost place among all the nations of antiquity in the grandeur of their memorials to the dead which have come down to us. Egypt has left monuments of the grandest proportions and of the noblest conception, which, because of their massive construction, have survived to us of a later generation in an almost unimpaired condition. What, among all of man's handiwork, appeals more strongly to the imagination than the Pyramids and the avenues of colossal figures hewn in stone? From the Greeks has come the highest inspiration of art, and the influence of this people will survive as long as the world endures. There are other proud nations of the older world which have left a durable impression through their monuments—Assyria, Chaldea, Phœnicia and Persia.

Aside from the effect that the study of these monuments has had upon our knowledge of the people who erected them, they have all exerted a more or less direct influence upon modern art work. One cannot visit a modern cemetery without realizing how freely our sculptors and stone workers have drawn upon the creations of the ancients. Many forms that were purely pagan in their origin have been transformed in time into Christian symbols that now speak to us of hope, of the resurrection and of a future life. While most of our mortuary sculpture owes its origin to this inspiration from antique forms, it has seldom been taken direct, but has been modified by hundreds of transition stages. In many cases the pure ideals of the past have been lost sight of completely, and the student cannot but realize the necessity for a closer study of the great art work of the past. It was, therefore, a particularly happy idea that led Messrs. William Brindley, the eminent English marble worker and sculptor, and W. Samuel Weatherly to compile what is universally conceded to be one of the most complete and sumptuous text books of its kind in existence. This is "Ancient Sepulchral Monuments," containing illustrations of over 600 examples from various countries and from the earliest periods down to the end of the eighteenth century.

The work is the outgrowth of what was originally a comparatively small collection of drawings of ancient sepulchral monuments made at dif-

ferent times to aid those who, rebelling at the ordinary modern monument, desired a worthier and more satisfactory memorial. The work consists of 212 plates, giving between six and seven hundred examples which range from obelisks and monuments to headstones and incised slabs selected to be practically suitable for modern use or adaptation, and to include typical examples from various countries down to the end of the last century. The drawings are for the most part to a uniform scale of one inch to the foot, which will be found valuable for comparison, the exceptions being where the size has prevented this or the delicacy warranted a larger scale. In numerous instances sections and details one-fourth real size are given. Four plates are devoted to alphabets taken from old works, and add to the usefulness of the book. Full descriptive indices are supplied in place of letter press, as the latter would have increased the cost and bulk of the work considerably. To facilitate reference the examples are arranged in groups, and when practicable chronologically. The drawings are all done with the greatest care and are splendidly reproduced. The need for such a work as this was shown by the universal chorus of praise that was bestowed upon it. It was welcomed by students and art theologists, by architects, artists and designers, by the stone men, who are so constantly called upon to erect monuments out of the stereotyped patterns, and by those of the general public possessing artistic taste. The late Queen Victoria, who had a noted fondness for erecting monuments, was deeply interested in the book, and purchased two copies for presentation. All of the leading architectural papers reviewed it at length. "The Builder" of London says:

"The book, as may be seen at a glance, must have been the work of years. The drawings comprise an immense number of examples which are not only very fine in themselves and historically interesting, but which are also very suggestive as starting points from which to work out new ideas in monumental designs of this kind. The subject is so large that it is no slight credit to the authors that they have illustrated it so fully as they have in one folio volume which is a very fine and a very useful one.

"The classes of monuments are arranged in groups, and in each group as far as possible chronologically. We commence with Egyptian obelisks, of which five are given, including two drawings of that monument of remarkable vicissitudes which is dated in the corner of the plate 'Heliopolis, B. C. 1500; Alexandria, B. C. 23; London, A. D. 1878,' and who knows where next? For it may outlast several more empires, for anything we know. Then follow some of the Assyrian obelisks now in the British Museum with their tops worked in steps or stages, two of them in *sloping* lines, like an imitation on a small scale of the type of tower with inclined plane stages round it, which has sometimes been made to do duty for the mythical Tower of Babel.

"If we were to endeavor to classify the forms of monument that have been used we might, perhaps, divide them into the obelisk form, the cross (which may be called the Christian parallel to the obelisk); the sarcophagus, with or without a figure on it; the upright sculptured slab, including the Greek stele; the horizontal sculptured slab; similar forms of slab with only

inscriptions and no carving except a little bit of decorative heading or border; and the arched recess, Gothic or classic, with a figure included within it.

"The treatment of the cross in monumental work is a curious study of variety in the way of regarding and treating the same object when we see as here a number of examples from different countries and periods together. One of the most curious and interesting is one on the first page on which crosses appear, a slab built, we are told, into a ruined church in Athens, and showing a cross with two cross arms (like a double transept), one above the other, formed by an interlacing ornament and with a base looking like an outlined section of steps. In two circles under the main arms of the cross are figures of birds, over them two pateræ. The whole thing is so curious in its mingled suggestions and reminiscences, half classic, half Byzantine, that it is to be regretted the authors did not give some further information as to its position and probable origin.

"The various examples of crosses worked on the faces of upright stones, especially the Celtic ones in Scotland, the Isle of Man and elsewhere, are full of suggestions in decorative design which might be worked out afresh with new detail. A great many examples are given of the form of equal-armed cross worked upon or into a circle, which is so effective in a decorative and symbolical sense. Among other forms of cross delineated here we notice the type of flat slabs cut out into crosses, of which the richly decorated example at Kilklispeen in Ireland is one of the most remarkable, and another the type showing a small cross on the top of a long and thin stem. This is shown in several varieties: a Celtic one from Tuam; several from Gosforth, Cumberland; a country cross from Jouarre, in France; a later one at Auvergne, and one from a church in Lincolnshire, and one from Tarragona, with a shrine and little figures on the top of the shaft.

"Of horizontal slabs, a number of most interesting and varied examples are included, some of them of great beauty of design.

"A good many of the late Renaissance tombstones with their pretty and naive little ornaments of vases in relief and cherubs' heads are given, interspersed with simple tombstones without any carving, but merely decorated by ornamental enrichments and by the manner of shaping the head. As this or something analogous is the only form of monument that the majority of persons can afford, a selection of examples and hints is of practical value; otherwise we should have said that the space given to them was somewhat disproportionate."

"The Architect" of London says:

"A more remarkable collection was never published, and apart from the interest which the subjects may have for the archæologists, they form a series to which a designer can always turn for a suggestion; the book is almost equivalent to a special museum. There are few finer examples of a Roman tomb than the one in the Vatican, dedicated to Scipio Barbatus, which is illustrated.

"The wall tombs are mainly Italian. Following the custom so largely adopted in England during Mediæval times, recumbent figures are introduced,

but while English knights were represented with hands joined as if in prayer, the hands of the Italian were crossed on the body as if lying in repose.

"The Roman tablets given in the volume, and which are worthy from examples in this country are straightforward records which might often be imitated. Messrs. Brindley and Weatherley's volume contains so many examples of suitable monuments there will be henceforth no excuse for any of the statuaries or 'masons' who continue to set up works which are enough to turn death into ridicule."

America has made a very good showing in its sepulchral monuments. Most of our graveyards are full of simple stones, having little attempt at ornamentation and bearing a plain incised inscription. The monuments that sin most notably against the canons of taste are the more pretentious ones. Few of these are the work of skilled designers, but represent purely commercial work. With the general diffusion of wealth in this country, there is naturally a growing tendency to erect more elaborate memorials in our cemeteries. Thousands and tens of thousands of dollars are frequently expended on a single monument. Our stone carvers are doing excellent work in the main, but every day the need grows more apparent for a greater variety of design and for a closer study of the great classical examples. Such a book as that of Messrs. Brindley and Weatherley should be in the hands of every enterprising monument man in this country who is called upon to furnish monuments more individual than the stock forms turned out by the wholesale makers and supplied in hundreds to the retail dealers throughout the country. The use of such a book as this is not alone in giving suggestion for the great monuments built up of many members, although these would be greatly benefited by a study of classical models. There are innumerable suggestions for simple headstones and slabs. There are beautiful Greek, Roman, Italian, German, French and early English monuments that are admirably suited for our American cemeteries and that might be copied with scarcely a single modification.

We have spoken in these columns of the growing favor in which the Celtic cross is held for memorial work. It seems to be slowly but surely replacing the Latin cross, which was formerly used almost exclusively in monuments. It is a peculiar fact, however, that use is made almost entirely of one form of the Celtic cross. There are scores of examples in this book, any one of which would suit the most exacting taste. There is particular need in seeking variety in this style of monument, as it is one that will not bear frequent repetition in a small cemetery. If the dealer would show dozens of designs for Celtic crosses, each one based upon a classical example, he would find that it would give a greater stimulus to his business.

There is another form of memorial that has been strangely neglected in this country, that of wall tablets. Many of our churches are bare and would be greatly improved by the erection of wall tablets to those who have taken a prominent part in the life of the church. Even a plain incised slab is better than the bare walls. But there is no form of memorials that permits of more chaste or artistic effect. We trust that the time will come when these will be greatly multiplied throughout the country.

In all of America there could scarcely be found half a dozen examples of tombs bearing recumbent statues. And yet it is these which give interest and beauty to the churches and cathedrals of the old world. The examples of these two forms of memorial to be found in the volume under review might do much to awaken interest and create a demand for these rich and beautiful tributes to the dead.

THE USE AND ABUSE OF EXPLOSIVES IN QUARRYING.

THE different methods of quarrying and the various processes employed to get stone free from the resting places in which it has been deposited by nature are wholly unknown to the general public, and many engaged in the quarrying business are using very crude and wasteful methods. The saying that "there is a place for everything" holds good in relation to the use of explosives in quarrying only so long as the use is not transformed into abuse. The writer of this, after some unsuccessful blasts, in which his calculations as to the amount of powder required to perform a given amount of work had, by such lack of success, been shown to be worthless and wrong, frequently has had occasion to laugh to himself when he would be accosted something after this manner by those who should have known better:

"My, but that was a great blast! Must have done a lot of good, didn't it? I thought it would shake the office down." As a matter of fact the blast had done a lot of damage to good stone, and the foreman was busy cursing his luck.

The process of quarrying the stone should be discussed under various heads, suggested by the kind of stone to be obtained and the purpose for which it is to be used. To quarry cellar and foundation stone no particular care is necessary, the problem in such cases being to get as much stone as possible at the least cost: This result will be attained best by blasting holes which have been drilled with such judgment in relation to the seams and heads as may be possessed by the person in charge. Right here, let me attempt to correct the error, common to the uninitiated, that the success of a blast is in proportion to the noise that is made by it. In one sense this is true, but the sense is the direct opposite of that believed by the majority of laymen. It is so true as to be almost axiomatic that "the *less* noise the more successful the blast," for in a blast where the amount of explosive used is in proper proportion to the work to be performed, there is much less noise than in one where the amount of explosive has been less than, or in excess of, the amount required.

To quarry mill blocks, dimension stone, building stone, broken ashlar, etc., requires a wide knowledge of mechanics. The laminated formations, or stone which has been formed by deposit, such as limestone, sandstone, or freestones of different kinds, are found in ledges or beds from one inch to many feet in thickness. The Knox system of blasting can be used to advantage in some of these stones, especially where the ledges are six feet or over in thickness. But the great ignorance in the use of powder displayed

by the average quarry foreman and the worse than ignorance of the after effects, so often unseen until too late, sometimes shown by those who should have the good name of their product at heart, has created, and will, I suppose, continue to create such endless trouble, so far reaching in effect that quarry owners who operate for the cut stone trade should never use powder when it is possible to obtain good results without it.

In argillaceous sandstone, that is, where alumina or clay is the cementing material, powder should not be used under any circumstances. The lamination being so cemented, the force of the explosion is very destructive, sinking into the lamination or "rift" of the stone so far and then expanding, forming those basin-like breaks which are so painfully familiar to the practical stonecutter. This kind of stone, quarried with powder, can be cut up for mill blocks, dried out or seasoned, then sawed into dimensions, such as step, coping and the like, and even set in the building without showing the powder shakes. But when the stone has been exposed to the winter frosts, what were invisible powder shakes will show up into fractures, giving no end of trouble to architects, owner and cut stone contractor. During the past season I have seen many instances like this just mentioned. One of them was in Syracuse, N. Y., in a building designed by a prominent architect. The result is that this architect will not allow powder-quarried stone in his work in the future if he knows it. I am very familiar with a quarry of argillaceous sandstone, the owners of which have for some years persistently quarried with powder against the advice of the best informed men in the place. The results here are that it is almost impossible to find a sound mill block come out of their quarries. Their blocks look as they leave the quarry as if they were to be used for riprap work in a breakwater. This concern has to contend with what might be expected: they must look for new markets every season. As the old proverb has it, "the burnt child dreads the fire," and people caught once with powder-butchered stone will be likely to fight shy of it in the future. I am sorry to say that I know of many instances where this concern cannot sell a second time to the same party. This is only one of the far-reaching effects of the injury of stone by powder. Another effect, and one of more than passing concern to the stone trade at large, I will but mention; that is the prejudice against the use of stone either for public or private building purposes which such instances as I have mentioned are apt to raise in the minds of the populace. Rest assured, our friends of the baked mud fraternity are not slow to seize upon and show up such cases to possible or prospective customers. The method in vogue during the past century has been, and still is, the true one, that is, to make a shearing or cut on each end of the quarry, and then use wedges across the entire quarry, cutting to the first ledge below, making successive steps of the face of the quarry according to the size and number of the ledges. In modern quarries the shearings or cuts are made with a channeling machine. The wedges may be plugs and feathers or otherwise, just as will suit the condition existing in the particular quarry.

In siliceous sandstones with beds or ledges ten feet or over in thickness

quantities of material have been removed and centuries have passed since the partially cut blocks and chiseled columns were abandoned. One is oppressed and awed, in the darkness and solitude, by the suggestions of the temple in these huge blocks ready for the master builder's use. As we lost sight of the little line of light which marked the entrance, and were shut in with the darkness and gloom, broken only by our flashing taper, it grew mysterious, weird and uncanny, almost to unpleasantness. A most interesting writer says: 'For ages and ages the darkness and silence have dwelt together in these dreary columns, while overhead, in the city, generations have come and gone. Its streets have been deluged with blood, and its glories have been leveled with the dust. And here silence and darkness dwelt, when the cry of "Crucify Him! crucify Him!" rang through the busy streets above, and a shudder ran through these gloomy regions when the cry went forth, "It is finished!" and a great earthquake shook the solid earth, while darkness enfolded the land.'"

The Rev. E. S. Wallace, for five years U. S. Consul for Palestine at Jerusalem, improved those years in the accumulation of material for his comprehensive book, "Jerusalem the Holy," from which the following instructive description is taken by permission of Messrs. Fleming H. Revell & Company, owners of the copyright:

"Solomon's Quarry.—A hundred yards east of the Damascus Gate is a high cliff made by a wide excavation which separates Bezetha from the New Calvary hill. Just at its base where the cliff is highest is a small door leading into the largest cavern near the city. The name given to this by the Moslems is 'The Cotton Grotto,' because of the unusual whiteness of the rock in which it is cut. The common appellation for it is Solomon's Quarry, assuming, and not without reason, that it was here that the royal builder procured the stone for his great works. For centuries all knowledge of the existence of this artificial cavern was lost. Since it was rediscovered, in 1852, it has been a place all visitors wished to see. And it is worth seeing, in itself apart from any connection it may have with any of the great builders of antiquity.

"The quarry extends southward under the city for nearly seven hundred feet. At some places the roof is so low that one has to stoop in order to pass; in other places so high that the light of the candle is swallowed up in the darkness. Here and there large natural pillars are left to support the roof, but these have not prevented the loose rock from falling, and as one passes a spot where such a fall has occurred it sends a shudder through him at the thought of a possibility of a similar catastrophe occurring during his visit. But none has occurred that has proved fatal to visitors; through carelessness persons have been seriously injured, and at least one death has resulted. As there are dangerous pitfalls from which the rock has been taken and which have never been filled up, a person well acquainted with the cave should accompany every party.

"The stone to be had in this quarry is exceedingly white and beautiful. It is soft and hence can be easily taken out. By the markings in the rock the ancient method of quarrying may be understood. By means of a pick

or similar tool, a deep groove was cut in the face of the rock to the width desired. This was followed by parallel grooves. It was then an easy matter when one stone was removed for all the rest in its tier to be taken out. This was done by making a small niche in the rock, driving in a wooden wedge and then pouring water on the wedge, which, as the wood swelled, split the stone. All through the quarries are small shelves on which stood the earthen lamps that gave light to the laborers.

"This cavern is of special interest to the Masonic order. Small and large parties of this fraternity visit the city every year and seem to find their chief delight in the gloomy recesses where they hold, many of them, that Masonry was instituted by King Solomon himself. Many a bit of white stone, large enough to be worked into an emblem of the order, finds its way into the trunks of the brethren and is carefully guarded till it takes its place among the sacred relics of the home lodge. Several large blocks have been lately shipped to various cities in America, destined to be worked into some Masonic Temple.

"From descriptions of the temples which at various periods of Jerusalem's history have graced the Mount Moriah, it seems but reasonable to believe that the stone that formed them was procured here. There is no stone like it, none so beautiful in the vicinity. The quarry is very near the place where the temple stood, and by making a surface opening in its southern extremity the distance of transportation would be very short. We are told in I. Kings, vi. 7, that the temple was erected without sound of "any tool of iron heard in the house," and was "of stone ready made before it was brought thither." This preparatory work could easily have been done in the quarry, almost on the very site of the Holy House, and yet no sound be heard within the sacred enclosure. There is no good reason for doubting that here the whiteness was procured that helped to produce the 'vision of snow and gold' that stood on Mount Moriah."

Supplemental to the foregoing, and in connection with the illustrations accompanying this article, I will refer to a few points not already covered. Before doing so, I would direct attention particularly to the reasons given by the gentlemen quoted for believing that from this source was taken the material for the temple, and the methods used in taking out the stone. The marks of the tools are still there, and are discernible in the flashlight picture of a portion of the interior herewith reproduced. Both gentlemen refer to the fact that the guide books do not use "the kingly appellation," and Mr. Wallace gives one name employed, "Cotton Grotto," and the reason therefor. "The Linen Grotto" is another designation sometimes heard. Baedeker, however, states that Josephus referred to them as the "Royal Grottoes," and the term "royal" appears in the encyclopedias quoted above.

The great extents of width and height demonstrate the immense amount of material taken out, while layers and piles of chips many feet in depth and extent plainly indicate how the stone was dressed before being removed.

Some have had the impression that Masonic ritualistic work was done and Masons made in this place by the Jerusalem Lodge. That is not so. It would be a most difficult task to transport lodge furniture into the cavern,

even if the Turkish government permitted it, which is improbable. The ritualistic work was done in the city, and the "lodge in the quarries" was not for work and instruction. There are places where brethren can assemble, tile the entrance, and organize a lodge in which prayer, addresses, resolutions or other expressions of sentiment can be had.

The location of the entrance to the quarries gives additional force to the interest which they excite. It is opposite to "Gordon's Calvary," or new Calvary Hill. Several good authorities agree with General Gordon in believing this to be the true Golgotha, the Place of a Skull. Standing at the entrance and looking across a depression or excavation, about three hundred feet wide, one has before him the rocky face of this eminence with the Grotto of Jeremiah beneath it. The theory is plausibly advanced by many that this excavation originally was a part of the royal quarries. General Gordon advocated the somewhat fanciful proposition that the contour of the range on which Jerusalem is situated represents the body of a woman. A contemplation of a model of the city and its surroundings demonstrates that the idea is not wholly imaginary. The hill he designates as Golgotha, Place of a Skull, represents the head. Following out his theory the royal caves or quarries would form the thoracic cavity.

In the picture of the group at the entrance the doorlike opening into the quarries can be seen in the background. On entering the descent begins at once, not by steps, but down a rather steep slope, which continues irregularly for several hundred feet. The floor is composed of chips and pieces of stone, such debris as would naturally accumulate in a quarry. The walking is rather laborious, and the journey is "rough and rugged." One needs to be continually on his guard in order to avoid pitfalls and stumbling blocks. The element of danger adds to the excitement and intense interest which thrills the visitor, and the vivid impressions he receives are not soon forgotten. As he progresses his wonder and admiration increases, and a strong desire possesses his soul that the mysteries might be made plain and that the rocks might tell the complete tale of how and why and when they were seamed, scarred and riven by the hand of man. About five hundred feet from the entrance is a spacious amphitheatre-like chamber with high vaulted roof. Here several thousand could assemble. As the spacious recesses and mysterious depths are partially revealed by the light of lanterns and torches the effect is weird and impressive. There are indications that shafts to the surface existed, up which blocks of stone could be hoisted, as Mr. Wallace has suggested. The almost inevitable conclusion one reaches after traversing these caverns is that the rough and smooth ashlar of the first temple were here hewn, and that a portion of the traditional eighty thousand workmen were here employed. Is it to be wondered at that a proposal to visit these quarries appeals with peculiar power to the heart of every member of the craft?

SPECIFICATIONS FOR RAILWAY MASONRY.

IN a recent report to the American Railway Engineering and Maintenance of Way Association the Committee on Masonry submitted the following general definition of masonry: "Masonry, in its widest sense, includes all constructions of stone or kindred substitute materials, in which the separate pieces are either carefully placed together, with or without cementing material to join them, or, if the pieces are not separately placed with care, are encased in a matrix of firmly cementing material."

The committee has prepared an approved general form of specification, which, with space for additions to suit particular circumstances, is as follows:

All stones used for masonry shall be sound, durable, well seasoned from sources approved of by the engineer, and shall be laid on their natural beds.

Mortar for laying up stone masonry, unless otherwise expressly stated, shall consist as follows: Either one part by volume measured loose of approved Portland cement to three parts of good, sharp sand, or one part of approved natural cement to two parts good, sharp sand, all to be very carefully measured and mixed, and to be used within one hour after mixing, and always before it shall have commenced to set.

Mortar for pointing shall consist of one part Portland cement to one or two parts of sand.

Finished copings, parapets, bridge-seats and other finely dressed special stones.—Work that comes under this head shall be of selected stone, of the best quality, free from defects, shall be very accurately cut, being finely bush-hammered where called for, and as per plan and dimensions given. To be laid to ⅜-inch joints.

First-class masonry will be laid in Portland cement mortar, in regular courses, each stone being carefully cleaned and dampened, if desirable, before setting. The face stones shall be rock faced, with edges pitched to a straight line, and no projections exceeding 3 inches. A draft line, 2 inches wide, shall be cut at each angle in the masonry. The beds throughout and the joints for 12 inches back from the face shall be dressed to lay to ½-inch joints. No course shall be less than 12 or more than 30 inches in thickness except the coping, and the thickness of any course shall not exceed the course below it. Stretchers shall not be less than 3 feet long, and not less than 18 inches wide, nor in average width than 1¼ times their height, and at no single place less in width than height.

Headers must not be less than 4 feet long, where the wall is of sufficient thickness, and the majority shall exceed that length. Where the wall is not over 5 feet thick, they shall extend entirely through the wall. Headers will extend at least 20 inches beyond the width of the adjacent stretchers. The usual arrangement shall consist of headers and stretchers, alternately arranged, so as to thoroughly bond together the face stones and the backing;

for rare exceptions, two stretchers will be allowed to one header, by special permission, to cover each such case. The stones of each course of the face must break joints at least one foot with those of the course below. No hammering will be allowed on any stone after it is set. Each stone must be set upon a full bed of fresh mortar, the broadest bed down, and brought to a firm and level bearing without spalls or pinners.

The backing shall consist of large-size, well-shaped stones laid in full mortar beds and breaking joints so as to thoroughly bond the work together. The spaces between the larger stones shall not be over 6 inches in width and shall be thoroughly filled with small stones and spalls laid flat, and all spaces flushed with mortar or good cement grout. The courses shall correspond with the face stone, but may be made up in part by two thicknesses, providing no stone less than 8 inches thick be used. In cases approved by the engineer, satisfactory Portland cement concrete with large stones embedded in the concrete may be used for backing.

Second-class masonry shall be laid in cement mortar. The face stones shall be rock faced, no projections over 3 inches, edges pitched to a straight line, shall have parallel beds and rectangular joints. The beds and joints for 8 inches back from face shall be dressed to lay not over ¼-inch joint. The stones need not be laid up in regular course, but shall be laid level on their natural beds, shall be well bonded, having at least one header 3 feet 6 inches long to every three stretchers with joints well broken; no stone shall be less than 8 inches thick, and no stone shall measure in its least horizontal dimensions less than 12 inches nor less than its thickness.

The backing shall consist of well-shaped stones, not less than 6 inches thick, and of which at least one-half shall measure 3 cubic feet, to be laid in full mortar beds, with joints well broken, well bonded together and with the face stone. All spaces to be thoroughly filled with small stones and cement mortar.

Third-class masonry shall be laid dry or in mortar, according to the direction of the engineer. It shall consist of good quarry stone, laid upon the natural beds, and roughly squared on joints, beds and faces, the stones breaking joints at least 6 inches; the wall shall be bound together by headers, occupying one-fifth of the area of the face of the wall front and rear, and extending through walls 3 feet or less in thickness; no stone shall be used in the face of the wall less than 6 inches thick or less than 12 inches on the least horizontal dimensions.

MORE ABOUT THE GRECIAN MARBLES.

A SHORT time ago there was printed in these pages an account of the quarries of Greece, taken from a German publication. Fuller particulars concerning certain deposits are given in a British Consular Report, and in view of the importance of the stones no excuse is needed for reprinting this.

The marble wealth of Greece, so extensively worked by the ancients, and especially by the Romans before the Italian quarries were opened up, lay

neglected for many centuries, says the writer. It is only during the last decade that any serious attempt has been made to develop this great national industry.

The next steps taken to reopen other Greek marble quarries were made by William Brindley, an Englishman who had been searching for many years for the genuine "Verde Antico," and who, at last, in 1894, discovered the original quarries of this, perhaps the most valuable marble of antiquity, between Larissa and the Vale of Tempe, in Thessaly.

Brindley thereupon formed a company, called the "Verde Antico Marble Company, London," for the working of these famous quarries, from which it may be mentioned were extracted the pillars of the new Roman Catholic cathedral in London.

This marble is brought down by rail to Volo, and thence either shipped to the central depot at Leghorn or direct to the purchasers. It is the genuine "Verde Antico" in different shades, some dark and some light. In all probability the large antique columns of the Church of San Sophia, Constantinople, the large columns in the Neapolitan and Roman Museums, and the rich decoration in St. Mark's, Venice, came from these quarries.

The Pentelicon quarries, near Athens, owned by this company, are of world-wide fame, and produce the celebrated blue and white marbles. The old quarries on this mountain, from which the columns of the Parthenon and other buildings of ancient Greece were extracted, still remain, and are worked in a small way; but the most extensive extraction is now carried on at the western end of the south side of the mountain and on the north side.

The Pentelicon marble is principally white, of various qualities, but there is also a good deal of dark blue marble called "Melana" or ink marble.

To work these quarries the company has laid down railways, inclined planes, wire sawing machinery and sawing and polishing sheds.

An interesting contract to which the "Marmor Company" is committed calls for 900 tons of Pentelicon marble per month for three years.

After Pentelicon, the largest number of quarries are found in the Island of Skyros, where the alabastery white, white tinged with violet, white tinged with yellow, and the variegated red and white marbles are all extracted. These marbles, however, are of exceedingly fine grain, and are difficult to obtain in large blocks.

This marble, which is perhaps as valuable as the "Verde Antico" of Thessaly, is found in layers in the mountains far from the sea. At intervals of 10 to 15 inches white patches appear, and the good marble of the deep red pigeon-blood color is taken from between the two veins of white. It is proposed to work these quarries after the manner of coal mining by following the strata underground.

Perhaps the largest quarries of antiquity, larger even than Pentelicon or the "Verde Antico" in Thessaly, are the Styra quarries, dotted round the southern end of the Island of Eubœa (Negropont). Of all colored marbles this is most in vogue at the present moment. It has the great advantage that it can be extracted in almost any lengths, and pillars and other decorations of this marble have recently been supplied for the Royal Academy,

the Roman Catholic Cathedral at Westminster, and the Belfast Town Hall, the contract for the latter being the largest ever taken out for marble decoration. The quarries of this marble are owned partly by "Marmor, Limited," and partly by Mr. Brindley.

The quarries in the Island of Paros have not yet been satisfactorily reopened.

From the Parian marble the Venus de Milo in the Louvre was carved, but it is believed that some of the veins have already been worked out.

In the year 1897 a British company, under the name of "Marmor, Limited," was started in Greece, with head offices in London, for the acquisition and working of the marble quarries of Greece. This company has carried on business in various parts of the Cyclades. In the island of Skyros they obtained, under a contract with the municipality of the island, the exclusive right to extract marbles for a period of 50 years. The work commenced in 1899, and until the end of 1901 the extraction amounted to 1,351 cubic metres. This marble was extracted from the old Roman quarries with which the island is honeycombed.

The marble consists of white, white and red, white and yellow, white and purple, etc., and also marble with many colors in one piece. Like most colored marble, however, this marble is very brittle, and it is exceedingly difficult to get large blocks. The grain is very fine, and the colors very delicate, but owing to its brittleness and the time incurred in extraction the expense is very great.

The company have put down installations, have built a mole, and made a road 7 kiloms. long, and generally employ about 300 men. The same company are extracting marble in Tinos, almost entirely dark green and black veined. These quarries were originally opened by a man named Seigel, a sculptor from Munich, who reopened these quarries under the belief that they were the long-lost "Verde Antico." The columns for St. Paul's, outside the walls of Rome, and the Roman Catholic Church, St. Dionisius, Athens, were extracted from these quarries by him under the belief that it was the genuine "Verde Antico."

The old quarries of Seigel and Kloebe in Tinos have been purchased by the company, and are being worked by steam machinery.

The Seigel and Kloebe quarries in Laconia have also been purchased by "Marmor, Limited," but at the present time are not being worked, owing to the unfriendly attitude of the peasants.

The green marble of Tinos, falsely put on the market as the genuine "Rosso Antico," and the "Rosso Antico" of Laconia, were worked in a small way half a century ago by the Bavarian sculptor Seigel, who settled down in Greece for that purpose.

On the death of Seigel the quarries were bought by a Mr. Kloebe, at that time German Consul in Syra, and carried on by him until his death. During the lifetime of Seigel and Kloebe a certain demand was created for these marbles, and when at Kloebe's death the quarries were closed the demand was filled by a second substitute, namely, "Verde des Alpes," extracted from quarries close to Genoa. This marble, although not being

the real "Verde Antico," which has recently been discovered near Thessaly, is still a beautiful marble, and as the quarries are near the sea, transport is easy, and the marble can be supplied at a low price.

The quarries began to be worked in 1900, and up to the end of 1901 205 cubic metres were extracted. The company, having installed wire saws on the latest principles, are able to extract blocks and columns of almost any size. The same British company have quarries in the Island of Naxos and Paros, which, however, have not yet commenced to work.

The Greek Company of Marbles of Paros have laid down installations in the Island of Paros for extracting and sawing marble, but they have not been very successful. This company also owns quarries in Naxos, Antiparos, and Amorgos, and are now negotiating with the British company to sell the whole of their plant.

Nearly all the other known marble quarries in Greece are owned by "Marmor, Limited," and are intermittently worked by them. This company extracted:

	Cubic Metres.
1896-97	756
1898	1,472
1899	2,275
1900	3,016
1901	4,355

Of the 4,355 cubic metres extracted in 1901, 857 cubic metres were exported, 930 cubic metres were delivered for use in Athens, 1,625 cubic metres were delivered for the Stadium, and 943 cubic metres remain at the quarries.

IMPROVEMENT OF ROADS NEAR ATHENS.

THE highways now connecting Athens with its seaport, Piræus, and with its bathing places on Phalerum Bay are narrow, poorly graded, poorly turnpiked, and poorly kept, making transportation between these places by carriage, wagon, or wheel quite disagreeable.

A new boulevard is now being constructed, starting at Hadrian's Arch on the Boulevard Amelia, Athens, and extending in a direct line and gradually sloping grade to the shore of Phalerum Bay, at a point nearly midway between Old Phalerum—the bathing place of the ancient Athenians—on the south shore of the bay, and New Phalerum, the bathing place of most of the modern Athenians, on the northwest shore.

The boulevard will be about 5½ kilometers (3.417 miles) in length and 30 meters (98.42 feet) in width. It is intended to divide it into a carriage drive, a bicycle path and a promenade for pedestrians, by rows of shade trees. Mrs. Syngros, a wealthy Athenian, has furnished the money to construct and finish the boulevard, and the cost is estimated at 500,000 drachmas ($58,823.50). The grading, culverts and bridges are well under way, and it is hoped to have the whole finished by next December.

The new boulevard will intersect a seashore driveway which now connects Old Phalerum with New Phalerum and Piræus, and it is expected that

in the near future this driveway will be widened into a broad avenue which will pass the zoological gardens now in course of construction, near Old Phalerum, and connect with an attractive driveway which passes along the face of the bluffs and promontories on the west shore of the bay, and along the ancient walls of Piræus, down to its harbor. When finished, the whole will form one of the most attractive drives in southern Europe, and will make the means of communication between Athens and the sea much more easy and agreeable. DANIEL E. MCGINLEY, Consul.

Athens.

THE PRODUCTION OF GRAPHITE.

THE production of graphite in 1901 is discussed by Dr. Joseph Struthers in "Mineral Resources of the United States, 1901," now in press, United States Geological Survey. The production of crystalline graphite was 3,967,612 pounds, valued at $135,914, as compared with the reported production of 5,507,855 pounds valued at $178,761 in 1900. The greater part of this product was derived from the mines at Ticonderoga, N. Y., although the mines in Chester County, Pa., produced a considerable quantity. The mine in Clay County, Ala., which was in operation in 1900, produced approximately 150 tons of graphite during 1901.

The production of amorphous graphite in 1901 was 809 short tons, valued at $31,800. Under this head is included the so-called graphite anthracite of Rhode Island, and also the so-called Baraga graphite of Michigan. In addition to this production there has been considerable activity in developing graphite mines in Georgia, Montana, Dakota and New Jersey; and, in the aggregate, some 2,500 tons of material have been mined and are awaiting the proper concentrating processes.

The amount of graphite imported into the United States in 1901 was 14,320 long tons, valued at $895,375. It appears that the domestic production of crystalline graphite amounted to but little more than one-tenth of the consumption for that year. The greater part of the imports of higher grade graphite is derived from the mines of Ceylon.

The production of Canadian graphite in 1901 amounted to 2,190 short tons, valued at $44,380, the output being mainly derived from the Brougham mines in Renfrew County, Ontario.

The manufacture of artificial graphite has increased greatly, the production during 1901 amounting to 2,500,000 pounds, valued at $119,000, as compared with 860,750 pounds, valued at $68,860, in 1900, and with 162,382 pounds, valued at $10,149, in 1897, the first year of commercial production. The sole producer is the International Acheson Graphite Company at Niagara Falls, N. Y. More than one-half of the output for 1901 was in the form of graphitized electrodes for use in the manufacture of alkali and bleach by electrolytic processes, the remainder being consumed in the manufacture of paints, lubricants, pencils, motor brushes, crucibles, and dry batteries.

Comment on Timely Topics

CEMENT PRODUCTION AND CONSUMPTION.

ON more than one occasion this magazine has spoken of the danger of cement overproduction in this country. That the warning was timely was proven by the fact that the articles have been widely copied and commented upon. In a few cases only was there any dissent from the conclusions arrived at. The danger in this line is made even more apparent by the statistics of production of Portland cement in 1901, given in the column of Mineral Resources, compiled by the United States Geological Survey, and now in press. During the year the production of Portland cement in the United States was 12,711,255 barrels, an increase of 4,229,205 barrels, or almost 50 per cent. over the production of 1900. It was valued at $12,532,360, as against $9,280,525 in 1900. In order to understand what prodigious growth the industry has made, and that it is not alone the result of the unexampled building activity of the past year, it is necessary to consider the figures of production for a longer period. In 1890 16 works produced over 335,000 barrels; in 1894 24 works produced over 798,000 barrels; in 1899 36 works produced over 5,652,000 barrels; in 1900 50 works produced over 8,482,000 barrels; in 1901 56 works produced over 12,711,000 barrels. In 1900 each one of the 16 cement works averaged a little over 20,000 barrels; in 1901 each one of the cement works averaged over 220,000 barrels for the year.

Aside from the multiplication of cement plants as shown in these figures, a very significant feature is the average increased output of each individual plant, to which reference will be made later. For the years 1897, 1898, 1899 and 1900 the imports of cement into the United States exceeded 2,000,000 barrels annually. In 1901 the imports were a little under 940,000 barrels. This remarkable disproportion is explained when we find that the percentage of the consumption of domestic Portland cement has grown from 13.2 per cent. in 1891 to 34.7 in 1896; to 73.9 per cent. in 1899; to 79.1 per cent. in 1900, and to 96.2 per cent. in 1901. The total consumption of all kinds of cement in the United States in 1901 was 20,573,538 barrels, and the total production of all kinds of cement was 20,068,737 barrels, valued at $15,786,789.

Frequent mention has been made of the fact that the manufacture and use of Portland cement is rapidly superseding natural rock and slag cement, but the figures are startling. During 1901 60 works produced 7,084,823 barrels of natural rock cement, valued at $3,056,278, as compared with over 8,383,000 barrels produced by 64 works in 1900, and with 9,868,000 barrels

produced by 63 works in 1899. The production of slag cement in 1901 amounted to 272,689 barrels, valued at $198,151, as compared with 365,601 barrels, valued at $274,208, in 1900. Up to January 1, 1902, the total consumption of all kinds of cement in the United States has amounted to 270,760,382 barrels, of which total the natural rock cement furnished 71.67 per cent.; imported Portland cement, 13.54 per cent.; domestic Portland cement, 14.79 per cent.

From the above figures it will be seen that the production of cement in the United States during 1901 was only 504,801 barrels less than the entire consumption. As the total importations during this time were about 940,000 barrels, this will leave a total of about 435,000 barrels of American cement exported to foreign countries, if no account be taken of the amount of stock on hand. While these statistics furnish a fine tribute to the enterprise and activity of American cement makers, they also present a grave element of danger to the future of the industry in this country, when the general condition of affairs is taken into account. For a long time the foreign cements were very widely used because of the deservedly high reputation they enjoyed. As improved methods of manufacture were introduced in this country, as American ingenuity made mechanical devices supersede manual labor and thus reduced the cost of production, and finally as the American cements came to have at last an equal reputation with the imported brands, it was but natural that the native material should largely crowd the foreign out of the market. The multiplication of plants far distant from the old centers of production does much to lessen freight rates, and thus gives a stronger foothold to the native cements.

The greater proportion of the foreign cement now used in the United States is sold in the seaport towns and particularly on the Pacific coast. Owing to the cheapness of ocean carriage the foreign cement makers are in a position to make a desperate fight for this portion of the market. However, foreign competition in the United States is not what is greatly to be feared, inasmuch as it has already been reduced to such slender proportions. The real danger is from domestic competition due to overproduction and to the fact that the English, German and Belgian cement makers, barred from the American markets, will make a fierce fight to retain their present supremacy in the foreign markets.

It may be well to dwell first on the latter feature. One thing that has given a decided advantage to the American over the foreign cement makers has been the method of shipping the material. Owing to the long sea voyage and the consequent danger of deterioration, it is necessary that the foreign cements should come here in barrels. Each barrel costs on an average fifteen cents, and when once it has been used it is worthless. The American maker ships his product in bags. When these are empty they can be returned to the mills at small cost, as they are very light and occupy but little bulk. For the return of empty bags a generous rebate is made, and in a large contract this cuts a considerable figure. When the American cement manufacturers seek to reach a foreign market they must use barrels as well as their competitors, and they cannot have this advantage. The increased

economy and efficiency of American mechanical devices is about offset by the much lower cost of labor in European countries. The foreign manufacturers will always have a certain advantage in the greater development of the carrying trade of Europe. One factor that must be taken into account is the matter of business methods in Latin America, where we should expect to find our largest market. Most of the business is in the hands of the foreign agents. American manufacturers seem unwilling to grant a six months' or year's credit, which is almost invariably demanded in South America. Foreign manufacturers have already adapted themselves to this un-American method of doing business.

But it is in the matter of domestic competition that the chief danger lies. We have already gone so fully into this matter in previous articles that it is necessary to say but little more now. When last we wrote we called attention to the fact that one of the largest and most promising of the new cement concerns had been compelled to pass a dividend and completely to reorganize the business. Since then several concerns have passed into the hands of receivers. One of the most recent is a company that started with immense capital and most flattering prospects. Inasmuch as disaster has overtaken it before its plant was built, it may be possible to save considerable from the wreck. There has been scarcely any diminution in the number of new cement companies that are formed every month, and many of these have already begun the construction of their plants. As it has come to be a recognized principle in cement making that little profit can be expected from anything less than a plant of a capacity of 1,000 barrels a day, scarcely one starts with a factory calling for less production than this. Some of them contemplate an output many times as large as the minimum. One vast plant is almost ready to begin production that is credited with a capacity of more than 3,000,000 barrels a year.

In the beginning of this article we spoke of the significant fact of the increased average output of the different plants. As we show, this has grown from a little over 20,000 barrels a year for each plant in 1890 to over 220,000 barrels in 1901. The old cement companies are rapidly doubling and quadrupling their plants, and these concerns will always have a certain advantage over the new companies in the same field. One of the greatest cement concerns in the United States, whose plants were formerly centralized, has within the past year adopted a new policy. It is erecting plants in all of the great centers of cement manufacture, and by this means it will always be enabled to meet competition in the matter of freight rates.

The past year has seen greater building activity in all parts of the United States than has ever been witnessed before in the history of the country. Owing to the unexampled prosperity great public and engineering works, which, more than anything else, make free use of cement, have been undertaken everywhere. The awarding of contracts for thousands of barrels of cement is a matter of every-day occurrence. New uses for cement are constantly being found. Despite all of these facts the price of cement has recently shown a steady and sharp decline. This is in the face of a decided rise in prices for almost every other kind of structural material. It must be

remembered, too, that the producers of natural rock cement are in much better position than for some time past. Heretofore there has been ruinous competition, but recently there have been consolidations that will greatly strengthen many of the companies.

We firmly believe that unless a stop is at once made in the exploitation of marl lands and the formation of great cement companies to utilize them, there will be a most disastrous drop in cement values everywhere, and that all of the weaker companies will be forced to the wall. One cannot look at the detailed statistics of production and think for a single moment that there is an opening for another plant in the present fields of cement activity. As such a low-priced material cannot stand high freight rates for long transportation, it is possible that there might be an opening for a limited manufacture of cement in a few of the outlying States that are rapidly growing, like Washington, the Dakotas and Texas. But the States that have gone cement mad should call a halt before it is too late.

Charles Becker, of Baltimore, has leased a valuable tract of stone land near Millville, W. Va., on the east side of the Shenandoah River, to a party of Baltimore capitalists, who will open a large dolomite and limestone quarry. A bridge, costing $30,000, will be built across the river to connect with the Baltimore & Ohio Railroad.

The big stone quarry on Round Island, in the Hudson River, is being operated this season as usual by Mr. Donovan, of Kingston. Just below it the Federal Government has a magazine on Iona Island, and last year it was reported that the Government would buy out Mr. Donovan at a cost of over $300,000, because it was feared that the blasts in the quarry might endanger the high explosives kept in store.

Thomas J. Allen has given a five years' lease of his granite quarry near Waterloo, N. J., to parties who are expected to operate it extensively.

Messrs. Dwyer and Kilkenny, of Utica, have leased the limestone quarry near Boonville, N. Y., owned by Mrs. Nora Tracy. The lessees will get out stone for canal purposes.

William Bradley & Son, of New York City, have been incorporated, with a capital stock of $100,000, to carry on a general quarrying business.

There are now 120 men employed in the big stone quarries at New Baring, near Index, Wash., and it is expected that the number will soon be increased to 300. The quarries are getting out stone for ballast on the Great Northern Railroad.

John H. May, a prominent stone contractor of Kansas City, will establish a large stone crushing plant about six miles south of Mena, Ark. He has large contracts for railroad ballast.

The city of Toronto is contemplating the purchase of a large limestone quarry at Longford, Ont., in order to get its supply of stone for macadam.

James Holman will open a stone quarry and establish a crushing plant near Columbia, Tenn. Mr. Holman has a contract to supply thirty carloads of stone a day for ballast for the Louisville and Nashville Railroad and for fluxing purposes.

The Brooklyn Red Granite Company has decided to abandon its quarry at Stony Creek, Conn., and is removing the machinery and equipment.

The Rogers Quarry Company, of which Col. William McRae is superintendent, is the leading industry of Cobleskill, N. Y., and is now giving employment to 150 men. The quarry has been open only a year, and yet more than 10,000 yards of fine building stone has already been removed. A large force of stonecutters is at work dressing the stone.

A new quarry is being opened at Summersville, near New Milford, Pa., on the farm of H. R. Morse, by C. M. Parker, of Nicholson. This makes the fourth quarry now in operation at that place.

The trustees of the New Castle, Del., County Workhouse are preparing to operate a stone quarry which is near that institution. Machinery is being installed.

A. F. Johnson, of Ingram, Pa., representing a syndicate of capitalists of Carnegie, has purchased from Alexander Elliott a farm of 125 acres near Herminie, Pa. This is all stone land, and an extensive quarry will be opened at once.

Two new quarries have been opened at McClure, near Deposit, N. Y., one by T. G Stewart and the other by A. S. Clark.

A quarry is being opened on the Samuel

Smith farm at Ballston Lake, New York.

The Callanan Road Improvement Company, of Albany, whose main quarry and works are at South Bethlehem, N. Y., is opening a quarry northeast of Saratoga, for the purpose of getting out stone for road building. A complete crushing plant will be installed.

The Hillsborough Pressed Brick and Stone Quarry Company, of Philadelphia, has been incorporated under the laws of Delaware with a capital stock of $200,000.

The Marion Stone Company is being formed at Marion, Ind., for the development of stone quarries on the farm of Dr. L. Williams, just north of that city. It is proposed to put in a stone crusher and supply both crushed and building stone. Capital, $10,000. Directors, William H. Charles, Charles W. Barley and Luther F. Frankboner.

The Lake Shore Stone Company, of Milwaukee, has leased the extensive quarries of the Lannon Stone Company at Lannon, Wis. The general management will be in the hands of Frank N. Merrill, while A. J. Blair, former manager of the Lannon Company, will be assistant general manager. Several large contracts have been secured by the consolidated company, including contracts with the Illinois Steel Company and the Minerva Furnace Company, to supply stone for fluxing purposes.

George C. Boldt, of the Waldorf-Astoria, is building a magnificent house on Heart Island, in the St. Lawrence, near Alexandria Bay. In order to get the stone for this structure the contractors, Pennock Bros., of Philadelphia, opened extensive quarries on Oak Island last summer. These are being vigorously worked at present, and several gangs of granite cutters are given employment.

The Erie County, N. Y., penitentiary has started a number of convicts at work in a quarry getting out stone for road improvements, which will be done under contract with the county.

The recently organized firm of Hurst & Cole, which has a stone yard at Johnstown, N. Y., has opened a quarry near Schenectady.

Enoch Mead, of Pueblo, Cal., has discovered a deposit of attractive white rock suitable for building purposes in the extreme western edge of Pueblo County, seven miles northeast of Beaver Creek station. He and his friends have taken up 800 acres of land and expect to develop quarries. Associated with him are C. B. Saxton, Judge Wells and Mr. Friedman.

Thomas Chadwick, a well-known quarryman of western New York and a member of the quarrying firm of Chadwick Bros., of Albion, is dead at the age of 57 years.

Thomas Hayes has sold his quarry at Sawkill to Terrence McDonald.

There has been incorporated at Plainville, Conn., the Connecticut Trap Rock Company, with a capital stock of $175,000. This is a consolidation of the leading crushed stone companies in the State. The companies included are J. S. Lane & Son, of Meriden; D. B. Pierce & Co. of Middlefield; Rocky Hill Stone Company of Rocky Hill, and the Cook Stone & Ice Company of Plainville. The officers elected are D. B. Pierce, Middlefield, president; Irving S. Tinker, Plainfield, secretary; Arthur S. Lane, Meriden, treasurer, and James H. Cook, Rocky Hill, general manager. The headquarters of the combine has expanded in New Haven. John S. Lane & Son are the most successful quarrymen in the State. Their business has expanded from the Meriden and Westfield quarries to extensive holdings in other States. The Pierce quarries at Middlefield recently installed an entire new plant at a cost of about $70,000. The Rocky Hill Stone Company was organized by James Cook, of Plainville, two years ago with a capital of $30,000. It controls 43 acres of quarry land, and probably has the best possibilities of any company in the combine. It is expected that a dock will be built here and the stone shipped in boats owned by the company. The Cook Stone and Ice Company owns 70 acres of land and was organized eight years ago by James Cook, now of the Rocky Hill quarries. The company has recently been operated by John Cook, Judge Neale and Irving Tinker, of Plainville. The merger will undoubtedly result in an advance in the price of crushed stone, as it is claimed that the industry has not been on a paying basis. A few years ago the price of the stone was $1.70 a ton, but recently it could not be sold for more than 60 cents a ton.

Benjamin Paschal and Mr. Ford, of Boston, stone contractors, have opened a granite quarry on Crotch Island at Stonington, Me.

The firm of Bothwell & Lane, 211 Broadway, New York, is reported to have examined the old Plymouth quarry and the Rattlesnake Hill quarry at Thomaston, Conn., with a view to purchasing them. From the Plymouth quarry has been taken some of the best building stone and monuments used in Connecticut. It is a high grade building and ornamental granite. The Rattlesnake Hill quarry was formerly controlled by Charles R. Baldwin, who was Mayor of Waterbury.

Marble and Granite

There has been found at Platte Mound, four miles west of Platteville, Wis., a peculiar stone which is declared by Prof. Buckley, of the State Geological Survey, to be a good grade of onyx. An analysis shows that it has a striking similarity to the best grades of Mexican travertine.

The Blue Mountain Granite Company has opened a quarry near Maria Furnace, Pa. The stone is being used for bridge work on the Baltimore & Ohio R. R.

What is said to be a fine deposit of marble has been discovered near Curtis, Woods county, Okla., and a quarry will be opened at once.

The building of the New Brunswick Red Granite Co. of Maine, at Calais, was destroyed by fire recently.

John Crowley, of Dedham, a contractor, has purchased a tract of granite land at Taunton, Mass., and will open a quarry. It will be equipped with modern machinery.

A sensation was caused among the Massachusetts paving block dealers by a statement of the Mayor of Fitchburg that he had been offered granite paving blocks for $35 per 1,000, a drop of $23.

George Mann, of Baltimore, Md., has opened a quarry of white and blue marble two and a half miles from Alford, Mass.

William B. Cass, of Hartford, Conn., has brought suit against Homer C. Allyn, et al., owners of the Allyndale marble quarries at North Canaan, in which he claims damages of $5,000 and has secured an injunction. Mr. Cass claims that he had a 15-year lease of the quarries when the defendant took possession of them.

Messrs. Boyce, Smith & Runals, who are operating the Sunapee granite quarries, are working them to their fullest capacity, having orders enough on hand to carry them nearly through the summer.

Kripps' marble yard, which has been in existence at Sixth and Federal streets, Camden, N. J., since 1847, has gone out of business.

Smith & Clark have opened a granite quarry on the west side of the river at Church Hill, near Augusta, Me.

The Portland Granite Co., of Racine, Wis., has been incorporated with a capital stock of $25,000. The incorporators are: Leo A. Peil, John O'Laughlin and David H Flett.

A quarry is being opened at what is known as Hodgkins & Campbell's ledge at Eden, Bar Harbor, Me. Over two acres of fine granite have been found and two crews are at work getting out the stone.

The Green Mountain Onyx and Marble Co. has been incorporated at Spokane, Wash., with a capital stock of $150,000. The trustees are J. L. Wilson, W. W. Tillingham and W. H. Christian.

William Ingram, a well known granite manufacturer and quarryman of Milford, N. H., died recently at the age of 65 years.

Benj. Bowen, of Vermont, will take charge of the work of developing the Jefferson marble properties, 12 miles north of Colville, Wash.

The White Crystal Marble Co., of Gouverneur, N. Y., which was formed recently to operate the Morrison & Whitney quarries near that place, is hard at work on a large contract for a palatial residence at Middletown. The company has over 40 men and eight or ten teams at work.

John A. and Alexander Davidson, marble contractors of Chicago, have filed a joint petition in bankruptcy. Their liabilities are $1,341,838, while their assets are merely nominal and are placed at $750. The petitioners are president and vice-president, respectively, of the Davidson Bros.' Marble Co., but their interests in the concern are so small that it is said their confession of insolvency has nothing to do with the standing of the corporation.

J. H. Gallagher, of Union, N. H., will engage in the marble and granite business at South Waterboro.

William G. Cook and W. D. Kenneth of Boston, have formed a co-partnership under the firm name of the Westerly Granite Co., with offices at 390 Boylston street, Westerly. They will conduct a general monumental business. Mr. Kenneth was formerly connected with the Smith Granite Co.

A. R. Speer, of the Forest Lumber Co., of Jackson, Miss., is the owner of a recently discovered marble deposit in Alabama. Mr. Speer says that the marble is a little dark-

er than that used for monumental stock, but that it takes a high polish and will be admirably suited for building purposes. It can be floated down the Tombigbee River directly from the quarry.

The Flint Granite Co., of Albany, has a contract for 250,000 paving blocks for that city and has put on a number of extra blockmakers at their quarry at Chester.

E. P. Kendall has taken out some fine specimens of black granite from an immense ledge two miles from Orford, N. H.

Owing to labor troubles at Stonington, Me., a number of quarries are largely employing Italians and Finns.

The Quincy Granite Quarries Co. has recently installed a large compressed air plant at the Churchill & Hitchcock quarry.

The Granite Railway Company, of Quincy, is installing a fifty-ton derrick with a ninety-foot mast.

Angelo Malnati has purchased a quarry at West Quincy which produces a fine dark stock.

The Berkshire Marble and Construction Company is the name of a new corporation which is being formed by New York, Westfield and East Longmeadow men to develop a quarry of white building marble at Zylonite. They have secured control of a tract of land at that place belonging to Charles A. Howland. The marble is more than 99 per cent. carbonate of lime.

H. M. Gipson, receiver for the marble firm of Williams & Field, at Brandon, Vt., has sold the property of the firm at public auction for $8,952. The High street quarry was bought by H. D. Bacon for $7,200. The quarry has been tied up by litigation for ten years past.

The Standard Granite Company, operating the Hall quarry at Mt. Desert, Me., recently had attachments placed on its property by various firms. The company reported to its creditors that its liabilities were $35,000. The assets consist largely of claims against western persons for granite sold under contract, but in some of these the amount involved is in dispute.

Joseph B. Reinhalter, of Philadelphia, has purchased a tract of land on the Gale farm at North Barre, Vt., for a granite manufacturing plant.

The Great Western Marble Works, of Cincinnati, O., has made an assignment to Whittington Underwood. The assets are $35,000; liabilities, $30,000; cause, pressure of creditors.

The Higgins-Jung-Kleinau Company, of Bloomington, Ill., has been incorporated to deal in and manufacture stone, granite and marble. Capital, $35,000. Incorporators, F. B. Higgins, J. P. Jung and C. A. Kleinau.

Ernest & Wilson, who have quarries of yellow marble at Valley, Wash., announce that they will erect several plants in different parts of the country for the manufacture of tarrazzo tiling from their marble.

Prof. W. D. Crawford has a deposit of dark red, light red, and blue-gray marble at Braswell switch, near Berryville, Carroll County, Ark. It is within half a mile of the railroad, and could readily be developed.

The North Carolina Pink Granite Company is getting out a large amount of stone, having contracts for several large vaults for Pittsburg, also for important bridge-work for the Danville and Western Virginia Railroad. The company also has a contract from Renier's Sons, of Pittsburg, for blocks for several large monuments, which are to be cut by Sculptor Barnicoat, of Quincy. The company is building a railroad line to its plant at Granite Quarry Station, N. C. On its granite land the company has discovered a large deposit, covering about 150 acres, of excellent clay suitable for the manufacture of fireproof bricks, porcelain and tile. The company will sell part of this and work the remainder itself.

No Stone Combine in Colorado.

The Board of Public Works of Denver, Col., contemplate a great deal of paving in that city this summer. An announcement was made in a local paper that the quarrymen sought to take advantage of this condition of affairs by holding back shipments and by raising the price of stone from a basis of 72½ cents a running foot for five foot, two and a half inch flags, to 80 cents a running foot. Thereupon it was announced that the Board would make no contracts until the price of stone returned to the normal. The quarrymen of Lyons, Col., are much exercised over the statement, which they declare is unfair and untrue. No combination of any sort exists among the Lyons quarrymen and they are shipping stone for sidewalks and building as fast as their working forces can get it out. The article in the Denver paper also states that the Lyons quarries agree to supply 20 cars per diem 5 foot flagstones. There is not enough stone opened up to supply 20 cars a day, although the quarries are working with all of the force obtainable, and are shipping as fast as it is quarried. Labor is very scarce, and the quarries are now paying from $2.50 to $3 per day.

Limestone and Sandstone

The Bennett & Van Cleft stone property, known as the Drake quarry, near Norwich, N. Y., consisting of about ten acres of land and quarrying machinery, has been sold to D. D. Cushman. Although the quarry contains an unlimited quantity of high grade bluestone, it has not been worked for several years.

S. B. Seybold and James S. Murray, of New Kensington, Pa., have purchased several stone quarries at Saxonburg and will begin operating on a large scale. One hundred men will be employed from the start, and the number will be increased gradually.

The office furniture of the Kingston Lime Stone Quarries & Contracting Company at 30 Broad St., New York, was sold by the Sheriff under an execution in favor of the Nitro Powder Company. The sale realized $148.

The Pope Cement & Brick Company of Pittsburg has purchased from A. G. Morris the bluestone quarries at Dunbar, Pa. The new owners will improve the workings to make the output of the quarries 600 tons daily.

J. B. Herring, for several years past manager of the Bedford Quarries Company's plant at Bedford, has resigned his position in order to engage in business for himself.

Messrs. Gillen & Gillen, proprietors of the stone quarry at Duck Creek, near Green Bay, Wis., are largely increasing their equipment. When the new improvements, which will cost about $25,000, are installed the plant will have a capacity of nearly five times as great as formerly. The Northwestern Railroad has a contract with this firm to take fifteen cars of crushed stone a day until September 1.

W. J. Patterson, of the firm of Patterson Brothers, stone contractors of Atlanta, Ga., has been examining beds of sandstone in Mitchell County, Ga. Mr. Patterson was of the opinion that owing to the small size of the deposit and the lack of railroad facilities it would not pay to open quarries at this time, although the stone is of good quality.

H. Larsen, of Rawlins, Wyoming, who has operated a sandstone quarry at that place for some time, has recently had grindstones made from his stone. Those competent to judge declare that they are of the highest quality, and Mr. Larsen intends to install machinery for the manufacture of grindstones.

R. E. Spence, of Oxford, has leased a bluestone quarry two miles west of Union, Broome Co., N. Y., which he is operating.

Owing to the furnace strike in the Mahoning and Shenango valleys, 200 Italians employed in the Union quarries at Hillsville were laid off. The Union quarries supply limestone to the independent furnaces in this region.

The Sand Rock Company of Fond du Lac, Wis., has increased its capital stock from $10,000 to $25,000.

The National Stone Company is the name of a new company being formed by Charles H. Johnson, William L. Johnson, Thomas H. Hartman and others of Newcastle, Pa. The company expects to quarry limestone.

The condemnation case of the Great Northern Railway Company against the Chuckanut stone quarry at Whatcom, Wash., has been carried to the Supreme Court. A Whatcom county jury allowed the owners of the quarry $80,000 damages. The Great Northern asked for a new trial, which was denied, and it then filed an appeal. The quarry has been handicapped by these proceedings and has been unable to turn out enough stone to supply the local demand alone.

The Pennsylvania Railroad has built a switch at Ashcom Station leading to J. E. Thropp's new quarry on the east side of Cove Creek.

The Bethlehem Steel Company has leased Charles H. Miksch's limestone quarry at Nazareth, Pa., and will take immediate possession. About forty men will be put at work, and it is expected to turn out fifteen carloads of stone daily.

The Beaver Valley Sandstone Company of Newcastle Pa., has been incorporated with a capital stock of $10,000. The directors are Charles G. McKee of Pittsburg, Peter Robertson of Wampum and Edward G. Wolfram of Pittsburg.

Charles Becker of Baltimore has leased

and will develop dolomite and limestone quarries at Millville, W. Va.

Two years ago the Oman Stone Company sought an injunction against the Louisville & Nashville Railroad Company and the Bedford-Bowling Green Stone Co. to prevent them from refusing it the right to use the quarry railroad which runs from Memphis Junction to the White Stone quarry. The courts have just decided in favor of the Oman Company, and the railroad is enjoined to carry such supplies as may be necessary for the former.

H. P. Scheel, of the Washington Monumental & Cut Stone Company, Spokane, Wash., has located a sandstone claim at Essex, Mont., directly on the line of the Great Northern Railroad. Although Washington has plenty of marble it is lacking in sandstone suitable for building purposes, and so it will draw from Montana.

It is reported that parties from Seneca Falls and Geneva, N. Y., have purchased a considerable acreage at Dresden, N. Y., and have contracted for upwards of 300 acres more. Years ago a quarry was operated there in a small way, but all of the land is underlaid with a fine grade of limestone, which will now be developed.

J. S. Rapp will open stone quarries at Union Mills, Ohio, making a specialty of foundation stone.

The West Virginia Plate Glass Company has been organized with a capital of $1,000,000 by Pittsburg and Morgantown men. A large glass factory will be erected in the vicinity of Morganstown, W. Va., and the company will, under subsidiary corporations, operate limestone quarries and glass sand veins that are near the factory site.

Reitz & Company, sandstone producers of Portsmouth, O., have incorporated under the name of The Reitz Stone Company, with a capital stock of $100,000.

Capt. Newton Mathers and W. W. Wicks are organizing a new stone company to operate a quarry on the farm of Capt. Mathers, just east of the William Johnson quarry at Bloomington. The capital stock of the new organization is $100,000. The Mathers farm consists of 60 acres of excellent stone land.

A. H. Ingham, of Santa Rosa, Cal., has leased a ledge of lime rock southeast of Cloverdale in Sonoma County, and will begin the manufacture of lime.

The various building stone quarries at Batavia, Ill., have been consolidated under the name of the Batavia Supply Company with a capital stock of $500,000. The following are the directors of the new concern: Major H. K. Wolcott, H. T. Hunter and L. J. Griffith, of Batavia; L. A. Busby, of Chicago, and Hugh A. Homes, of Detroit, Mich.

William H. Albright is quarrying limestone for flux for the Boston and Montana smelter at Albright's Station near Great Falls, Mont. For some time past the output of the quarries has been as much as 500 tons a day.

At the limestone quarries at Califon, N. J., a blast recently loosened 5,000 tons of rock. It will take 150 cars to remove it.

Newark's New City Hall.

For many years the city of Newark, N. J., has contented itself with a city hall that was by no means adequate to the business needs of such a great industrial center. The old city hall was built many years ago of the native brownstone, which has weathered well. The building follows the Egyptian style of architecture and is still a rather striking structure in appearance, although it has been much marred by the various devices that have been resorted to to give increased accommodation to the growing city departments. A very handsome new structure is now to be erected after plans by John H. and Wilson C. Ely, and the contract for this has just been awarded. Three bids were submitted. One was by John Pierce, of New York, and two by Edward M. Waldron, of Newark, one of $1,105,749 for a granite building, and the other of $1,153,826 for a marble structure. The last was the only bid submitted for marble, and Mr. Waldron's figures for a granite structure, which were lower than those of Mr. Pierce, were the ones that were finally accepted. Before the final award was made a few changes were decided upon in the specifications. The rear elevation will be of pressed brick instead of granite and marble wainscoting will be used for the corridors on the second floor. When allowances were made for these changes, the final contract price was $1,088,192.

The stone to be used is that from the quarries of the Webb Granite and Construction Company, of Fitzwilliam, N. H. The decision as to the stone was not made until the City Hall Commission had satisfied itself as to the quality of the stone and the ability of the quarry company to supply the material without delay. A committee, consisting of Architect John H. Ely and Thomas B. Clark, advisory architect of the commission, visited the quarries in New Hampshire and made a thorough inspection. Upon their report the contract was awarded.

Stone Trade Notes

The Bay Port Stone Company has been organized at Saginaw, Mich., with a capital stock of $25,000. The officers are: W. H. Wallace, Bay Port, chairman; T. A. Harvey, secretary, and George B. Morley, treasurer, both of Saginaw. The company is entirely distinct from the Bay Port Quarry Company, in which the same gentlemen are interested.

The Metile Construction Company, of Syracuse, N. Y., has been formed by John J. Cummins and Edward K. Butler, of Syracuse and two New York capitalists. The company will have a factory in Philadelphia, where a substitute for marble and tile known as "metile" will be manufactured. This substance was discovered by a German chemist and is now being made in Germany.

Holyoke, Mass., is considering the establishment of a rock crushing plant with a capacity of 100 tons a day. Last year the city paid 75 cents a ton for crushed stone, but the lowest bid this year was 90 cents.

John Ogilvie, one of the best known stone contractors in Western Pennsylvania, is dead, at the age of sixty-three years. Mr. Ogilvie was born in Scotland, but came to America and settled in Allegheny in 1887.

The Valley City Stone and Crushing Company, of Grand Rapids, Mich., has been incorporated with a capital stock of $20,000.

The Northampton, Mass., City Council is establishing a crushing plant.

The Knickerbocker Ice Company has established a large crushed stone and screened gravel plant at the Wheeler quarry, near Janesville, Wis. The plant is equipped with two 120-horse-power boilers, a 50-horse-power hoisting engine, two rock crushers, revolving screens, etc. It will have a capacity of twenty-five carloads of gravel and crushed stone a day. John Buster is superintendent.

The American Crushed Stone Company, of Chicago, has been incorporated with a capital of $50,000. The incorporators are: James A. Kelly, S. M. Allen and C. L. Billings.

The Beaver Dam Marble Company, of Baltimore, has a contract for 400 carloads of crushed stone for the bridge banking at Orangeville on the Baltimore and Sparrows Point Railroad.

Smith & Post, of West Catskill, N. Y., have started their crushing plant with a large contract for the village of Catskill.

The Oklahoma Stone Manufacturing Company, of Oklahoma City, Alva, Shawnee and Lawton, has been incorporated with a capital stock of $50,000. The incorporators are: Wm. Ash, H. K. Bickford, of Alva; J. M. McCormick, of Oklahoma City, and C. A. Ranson, of Perry.

The Lancaster, O., White Sand Company has been incorporated with a capital stock of $12,000. The officers are: George Merritt, president; Charles Wandless, vice-president; C. P. Cole, treasurer, and Ed. H. Hall, secretary.

J. M. Boutwell, of Barre, is installing in the quarry of the Langdon Granite Company, a derrick with a guaranteed lifting capacity of 75 tons. The mast is 100 feet long and 30 inches square at the butt, and the boom will be 75 feet long and 22 inches square at the butt.

Edson Brothers, of Phelps and Waterloo, N. Y., have incorporated under the name of the Waterloo Crushed Stone Company, with a capital stock of $50,000. The directors are H. W. Edson and W. N. Edson, of Phelps, and J. A. Metcalf, of Buffalo.

The Powell Brick and Stone Company, of Oakland, Cal., has been incorporated with $300,000 capital stock. The directors are: C. G. Powell, Samuel H. Williams, Charles E. Fischer, R. B. Mott and A. P. Holland.

The Newkirk Stone and Construction Company, of Newkirk, Okla., has been incorporated with a capital stock of $10,000. The incorporators are J. M. Haynes, W. D. Lewis, J. C. Armstrong and William M. Jenkins.

The Haselton Stone and Coal Company, of Youngstown, O., has been incorporated with a capital stock of $10,000.

The Clydesville Stone Company has begun an action at Newcastle, Pa., to recover $1,000 damages for trespass from Joseph D. Rhodes. The plaintiff alleges that the defendant cut a guy rope to a derrick and thereby endangered the lives of its employes.

The Lancaster, Pa., Cut Stone Company has been incorporated with a capital stock of $12,000. Gustav Groetzinger is president.

The British Columbia Mica Company, Ltd., will be incorporated with a capital stock of $1,000,000, to carry on mica mining in British Columbia. The people interested are Messrs. S. Winters, William Christa, James D. McCooke, Andrew N. Jones, of Moncton and Gurney R. Jones, of Lewisville.

Charles H. Allen is opening a quarry at Windham, Me., to get out stone for the abutments to a bridge to be built at Little, by the Portland Railroad Company.

Kestner Brothers have begun crushing stone on a city contract at Reading, Pa. They are operating their plant thirteen hours a day.

The American Granite Working Company has been incorporated at Philadelphia, with a capital of $500,000. The company proposes to work granite by a new patent process that will enable the hard stone to be dressed and cut as rapidly and economically as the softer stones now are. It is proposed to form subsidiary companies to operate in other cities.

The Standish Stone Company has been incorporated at Bridgeport, Conn., with a capital stock of $30,000. The officers are: President, George W. Standish; treasurer, W. T. Hincks; secretary, C. H. Trowbridge, of Milford. The company will crush stone, make roads and do all kinds of contracting of this sort.

The Monarch Stone Company, of Clear Creek, Ind., has been incorporated with a capital stock of $15,000. The directors are: W. T. Breeden, J. H. Louden, A. G. Allen, S. E. Carmichael, L. F. Dimmitt, G. W. Mefford and Theodore J. Louden.

The City of Spokane, Wash., has purchased a new rock crusher of the portable variety. It will be operated by electricity.

The firm of Ellin, Kitson & Company, whose stone yard is now at the foot of West Twenty-fifth street, New York, has purchased a tract on the river front in Ravenswood, Long Island City. The purchase is bounded on three sides by Vernon avenue, Pierce avenue, and the East River, and on the other side by the works of the John Good Cordage Company.

The Momence Daily Progress prints a portrait and sketch of Mr George E. Beale, general superintendent of the Brownell Improvement Company, of that city. Mr. Beale is only thirty-two years of age, was born in Janesville, Wis., and was engaged in the railroad business both in the east and in the west. When the Momence Stone Company came into existence Mr. Beale was appointed general sales agent and superintendent, and served in that capacity until the property of the company was leased to the Brownell Improvement Company, when he was retained as the superintendent by the latter organization. The company is a progressive one and operates extensive quarries at Momence, Ill.

Ohio Sandstone for Cleveland Federal Building.

A monster petition, bearing over 22,000 signatures, was recently sent to Washington asking for the adoption of Ohio sandstone in the place of granite in the construction of the new Federal Building to be erected in Cleveland. This is certainly a reasonable request, and will doubtless be given attention by the Federal authorities.

This magazine has always advocated the use of local stone, where the latter is of recognized reputation for durability and attractiveness, in the construction of public edifices. It is fitting and proper that the government should make a general rule as to the use of granite for its public buildings, but the rule should be so flexible as to permit of exceptions for good and sufficient reasons. It is eminently proper that the National Government should fix upon white marble for the construction of the great public building in Washington, in order to have uniformity and to carry out a general scheme for the systematic development and beautifying of the Capitol. But it would seem an invidious distinction if the Government authorities should insist upon the use of granite for a Federal building in the center of the Indiana limestone district or of the Ohio sandstone region. This magazine put on record its attitude in favor of the contention of the Indiana limestone quarrymen that the Federal building at Indianapolis should be constructed of that material in place of imported granite. The same arguments then advanced are full of weight in the Cleveland case. Ohio sandstone is everywhere recognized as one of the best structural materials this country produces. It has been used for all sorts of purposes for generations and has never failed to give satisfaction. It would be a decided blow to local pride if this stone should be set aside for an imposing building in Cleveland in order that the granite from a distant State might be used.

Monumental News

Lupton Brothers, monumental workers, of Perth Amboy, N. J., with branches in several nearby towns, have just completed a $14,000 mausoleum for John W. Borden at Manasquan. It is 16x18 feet and 25 feet in height.

The descendants of Conrad Weiser, a famous Indian agent, of Berks County, Pa., are planning the erection of a monument to his memory near Womelsdorf. Weiser died in 1760, and has a great number of descendants, more than 500 living in Ohio, Indiana and Illinois, alone.

A project is on foot at Williamsport, Md., to erect a statue in memory of General Otho Holland Williams, the Revolutionary hero and founder of the town.

A committee is collecting funds for a monument to the Canadian poet, McLachlan, in Greenwood Cemetery, Orangeville, Ont. Rev. E. H. Dewart, 515 Sherbourne street, Toronto, is in charge.

The Massachusetts State House Commission has virtually decided upon a location for the proposed memorial to the late Governor Walcott. This is the center of the winding stairway to be built to the State House. It will take the form of a bas relief of the War Governor of 1898, surrounded by figures of the Spanish War volunteers.

William Granville Hastings, a well known sculptor, is dead at Mt. Vernon, N. Y., at the age of thirty-four years.

The Soldiers' Monument Committee of Wallingford, Conn., has already raised a considerable sum for the proposed memorial in that town, and it is believed that the entire amount needed will be in hand shortly.

St. George's Society, of Baltimore, has purchased a lot in Druid Ridge Cemetery and proposes to erect a suitable monument.

Cleveland, O., proposes to erect a monument to Andrew J. Rickoff, late superintendent of schools in that city.

A New Market battle monument, costing $3,000, is to be erected on the grounds of the Virginia Military Institute at Lexington.

J. Wellington Ruckstuhl, the New York sculptor, has submitted a model for the Confederate monument to be erected by the Daughters of the Confederacy in Baltimore. It represents a young Confederate standard bearer, wounded to death, but still clinging to his torn and shattered banner. He is supported by Glory with outstretched wings, newly alighted on the battlefield. She supports the dying soldier with her right arm while her left arm is advanced, checking those who would rush forward to crush him, and holding aloft a laurel wreath. The design is novel and striking.

A huge granite boulder weighing twenty-two tons has been taken from Cape Ann to Newburyport, Mass., to serve as the pedestal for the heroic bronze statue of the Volunteer, designed by H. H. Kitson for the Soldiers' Monument Association.

The Committee of the Strathcona and South African Soldiers' Memorial Fund of Montreal, has issued an invitation for designs for a monument to be submitted by November 1. The cost is between $25,000 and $30,000.

Congress passed a bill and the President signed it appropriating $25,000 for the erection of a monument to the memory of Gen. Hugh Mercer, a Revolutionary hero, at Fredericksburg, Va.

The Board of Supervisors of Chesterfield County, Va., has been authorized by the Legislature to raise money for a Confederate monument.

Congress appropriated $100,000 for a monument in Fort Greene Park, Brooklyn, in memory of the Prison Ship Martyrs. All artists in America will be invited to submit designs in open competition.

The Alumni Association of the Oswego, N. Y., Normal School will erect a monument in memory of the late Dr. E. A. Sheldon.

A movement is on foot in Springfield, Mo., for the erection of a soldiers' monument in Oak Ridge Cemetery.

The voters of Los Angeles County, Cal., will be called upon to decide on the question of erecting a monument to the late United States Senator Stephen M. White on the Court House Square, at Los Angeles

Delaware County, Pa., has decided upon plans for a soldiers' monument at Media. They call for a thirty foot shaft of Barre granite surmounted by the figure of a private soldier twelve feet in height. The total cost will be about $12,000.

Elizabeth, N. J., expects to raise $10,000 for a soldiers monument.

Middle Spring, Pa., will erect a monument to the Revolutionary soldiers buried at that place.

The people of Fort Ann, N. Y., will erect a monument to commemorate the Revolutionary battle at that place.

Augustus St. Gaudens has been commissioned to make the bronze statue of the late Marcus Daly, which will be erected at Butte, Mont. The price to be paid is $25,000.

During the past two years funds have been collected for the erection of a monument to General James Oglethorpe, the founder of the colony of Georgia, on St. Simon Island, Ga. It is hoped to erect the monument this summer.

An association has been formed at Nebraska City, Neb., for the purpose of erecting a monument to the late Secretary of Agriculture, J. Sterling Morton, "the founder of Arbor Day."

Chittenango, N. Y. is talking of a soldiers' monument.

The public school teachers of Washington are raising a fund for a monument to the late Gov. John R. Rodgers, of that State.

A monument of Missouri granite costing $1,500 will be erected over the grave of Robert M. Stewart, once a Governor of Missouri.

It is expected that Congress will appropriate $25,000 for a monument to Gen. Sumter, the Revolutionary hero, at the place which bears his name.

An equestrian statue of Gen. Slocum is being erected at Gettysburg. The pedestal was erected by C. E. Tayntor & Co., of New York.

The settlers of Coon Valley, near La Cross, Wis., will erect a handsome monument in commemoration of the advent of the whites in the valley.

The Typographical and Letter Carriers' Unions are raising funds for a monument to the late Congressman Amos J. Cummings.

The Fond du Lac County Council has appropriated $5,000 for a soldiers' monument on the Court House grounds.

Wallingford, Conn., hopes to raise $3,500 for a soldiers' monument; the sum of $1,200 has already been subscribed.

Gypsum and Marble in Alaska.

The Pacific Coast Gypsum Manufacturing Company is the name of a new concern that has been organized at Tacoma to develop a very extensive deposit of high-grade gypsum in Southeastern Alaska. This is at Tyonkeen Bay, on Chatham Straights. It is about half way between Sitka and Juneau. The company expects to build a factory in the vicinty of Tacoma to manufacture the product. Some of it will be made into plaster of paris, and much will be burnt for land plaster. A. C. Little, general manager, recently returned from an investigation of the Alaska deposit, and he spoke as follows concerning it:

"We now have 300 acres of land through which runs a gypsum deposit 75 feet in width and 2,000 feet in length. We shall probably find later that the deposit comes down to the water's edge, but the erosions of time have covered up all croppings along the shore. Our tramway to convey the mineral to the wharf will be 3,000 feet in length.

"Adjoining the gypsum deposit, lying along what might be called a hanging wall, is a large deposit of cement clay and next to the clay is a deposit of pure carbonate of lime. The combination of these two makes a fine hydraulic cement, for which there is a good market. Higher up on the mountain side are immense ledges of marble. This marble is of every variety from pure white to blue black, and the deposit is 1,500 feet in width and extends back for two miles.

"Through our land is a fine stream that will yield us 150 horse-power when utilized. There are also immense bodies of timber in that section. The yellow cedar is a very valuable commercial timber. Spruce and hemlock are there in abundance."

"Within sixty days we will commence shipping. We are about to make a contract with a transportation company for carrying our gypsum at very favorable prices. In order to supply the demand already in sight it will be necessary to bring down 10,000 tons of rock before the close of the present year."

Montana Sandstone.

Montana has made a fair start in the stone industry, although the amount of business done bears no relation to the resources of the State. The total output of stone for 1900, the most recent year for which figures are available, was valued at $211,014. A large part of this was in limestone, which was valued at $141,043. Next in value came sandstone, the output of which was valued at $59,630.

With the rapid growth of the State it is certain that much more generous use will be made of its splendid resources in the way of stone. For some time past, this magazine has had occasion to note the work being done by the Montana Sandstone Company, of Butte, which is operating quarries at Columbus. A sample of stone from these quarries has just been received at the office of this magazine. It is a close-grained sandstone of excellent texture and of most attractive color. It is a lively gray and bears a strong likeness to some of the most popular of the Ohio sandstones. It works readily and is particularly pleasing in appearance when tooled or sand rubbed. Three-inch cubes of the stone were tested by Riehle Bros., of Philadelphia, who have submitted a most favorable report. The specimen showed no evil effects from the frost test. When subjected to compression test, a three-inch cube spawled at 57,000 pounds and broke at 76,000 pounds. The stone has a specific gravity of 2.34 and shows 3.9 per cent. absorption. Mr. H. L. Frank is at the head of the company, which is already filling large contracts for the stone.

The Slate Trade

C. F. Brooks, of New York, sole owner of the New York quarry at North Bangor, Pa., is dead at the age of 60 years.

The Cardiff Peach Bottom Slate Manufacturing Company of Harford County, has been incorporated at Belair, Md. The capital stock is $25,000, and the directors are Messrs. Nelson H. Heaps, William D. Waltz, Griffith Griffiths, John Parry and Thomas J. Williams. The principal office will be at Cardiff.

Henry J. Masters has resigned as superintendent of the United States quarry at Pen Argyl, Pa., to accept the superintendency of the quarries of the Eureka Slate Company at Placerville, Cal. At these quarries a tunnel 500 feet long is being cut for drainage purposes. The company has made excellent progress in quarrying and shifting slate this season.

R. C. Penney, formerly superintendent for the Monson Maine Slate Company, is now in charge of the State of Maine quarry.

The Edwards Slate Company has erected an inclined cableway 1,200 feet long in its quarry on the Bullock farm at Middle Granville, N. Y.

The prospects are regarded as excellent for the development of the Cool slate quarry at Brandon, Vt.

The Albion Slate Company, of Pen Argyl, Pa., has elected the following directors: Conrad Miller and John A. Miller, of Nazareth; C. Ledyard Blair, of New York City; D. C. Blair, of Belvidere; Dr. W. H. Vail, of Blairstown, N. J.; C. N. Miller, of Bangor, and R. S. Brown, of Easton. The directors organized by electing Conrad Miller president and treasurer, and Birge Pearson, of Easton, secretary.

The Keystone Slate Company, with principal offices at 800 Broad street, Newark, has been incorporated under the laws of New Jersey. The capital is $125,000, and the incorporators are Emery A. Miller, Henry W. Egner, Jr., and Charles E. S. Thorn.

The Capital Slate Company, of Montpelier, Vt., has increased its capital stock from $5,000 to $10,000. Its quarries are at Northfield.

The California Slate Company has this season begun operations at its new quarries near Placerville, Cal.

The American Slate Company of Pen Argyl, has recently suffered considerable damage to its property from trespassers.

The Crown Slate Company, of Pen Argyl, Pa., has elected the following directors: F. Hussey, of New York; L. W. Morss, of Scranton; M. L. Tinsman, of Columbia, N. J.; John I. Miller, of Portland, and Alfred Doney, of Pen Argyl. The directors organized by re-electing T. Hussey, president; L. W. Morse, treasurer and general manager; Alfred Doney, vice-president and superintendent, and M. L. Tinsman, Secretary.

The California-Bangor Slate Company is opening extensive quarries in the Kelsey district, near Placerville. The company owns fully two miles of the slate belt, adjoining the property of the Eureka Slate Company. The quarry will be equipped with the latest improved machinery, which will be much heavier than any ever used in the county.

The Atlas Slate Company, of Slatington, Pa., has made application for the appointment of a receiver.

Owen Jones and Joseph Brown, of Slatington, have leased a tract of land at Slaterdale, Pa., from Thomas H. Shenton and will open a new slate quarry. Rice Bros. have also leased some of the same land and will also start quarrying.

The new Gem Slate Company has been incorporated at Danielsville, Pa., with capital stock of $100,000, to manufacture roofing slate and blackboards. The directors are Cotton Amy, East Bangor; Dr. D. H. Keller, Bangor; J. H. Flint, W. T. Schenck and D. H. Valentine, Brooklyn; Frank Reeder, Easton, and A. M. Paff, Bangor.

Joshua Bray, of East Bangor, Pa., has purchased William H. Bowers' interest in the Bowers & Mutton slate quarry at Bangor, and hereafter the business will be conducted under the name of Mutton & Bray. Mr. Bowers is operating the Bangor Valley quarry to its fullest capacity.

Auld & Conger have purchased of E. G. Hooker for $7,000 a slate quarry located in South Poultney, Vt.

The Supreme Court of Pennsylvania has affirmed the decision of the Northampton County Court in the case of the Bangor & Portland Railroad against the American

Bangor Slate Company et al., dismissing the bill in equity filed, with costs to the complainants. The decision is an important one, in that it disposes of a number of suits of a similar character and incidentally will deprive the Lackawanna Railroad, which controls the Bangor & Portland, of freight revenues estimated to aggregate $1,000,000 annually. The Lehigh & New England Railroad, the competing line through the Northampton County slate regions, will be very materially benefited by the decision. In September, 1884, General Frank Reeder, president of the American Bangor Slate Company, made a contract with Conrad Miller, of the Bangor & Portland Railroad. Mr. Miller, a stockholder and director of the slate company held practically all of the stock of the railroad company at that time, and the late John I. Blair had all the bonds. The slate company was in debt, with one judgment about to be enforced by the sheriff and another mortgage on the point of foreclosure. Mr. Reeder consulted Mr. Blair, who agreed to make a loan of $15,000 in consideration of the contract, which became the subject of this litigation. It provided that the slate company should give all its product to the railroad, as well as other freight, the latter to accord rights to any competing line that might come in. Later on the Lehigh & New England Railroad entered the field and sought a share of the carrying trade. The American Bangor Slate Co. undertook to give its business to the Lehigh & New England, and a bill in equity was filed last September to compel enforcement of the contract made in 1884, the American Bangor Slate Co. and the Lehigh & New England as well as the American company, separately and collectively, resisting a decree against them on the ground that the contract was not authorized by the directors of the American Co., that it was not legally executed by the president, that its existence was not known to the individual members of the company, and that it had not been ratified or affirmed. On this last ground the Supreme Court declared the agreement invalid.

Jay S. Moyer, Alvin N. Brown, John H. Fuenfstueck, Raymond W. Lentz and Herbert P. W. Muse, of Allentown, Pa., have applied for the charter of a corporation to be called the Heimbach Slate Company.

The Empire Slate Company, of Lehighton, Pa., which recently increased its holdings by the purchase of 109 acres of slate land, has added four new members to the firm. In the old directorate were Dr. C. T. Horn, of Lehibhton; John Hauk, of Parryville, and W. Henry Seip, of Danielsville. The new members added are Dr. Joseph A. Horn, of Mauch Chunk; Andrew Breslin, of Summit Hill; Frank Laury, of Weissport, and N. M. Balliet, of Lehighton.

Famous Monoliths in New York.

One of the noted landmarks of New York that is disappearing under the march of modern improvement is the old Colonade Hotel on Lafayette Place, opposite the Astor Library. This was built more than fifty years ago by John Jacob Astor, and was for many years the finest hostelry on Manhattan Island. It got its name from the colonaded front, where fourteen large and beautiful Corinthian columns were erected. For many years past the building has been divided up into business offices, but the colonade has always been admired by those who could appreciate artistic architectural effects. It has been proposed that these fourteen monoliths be purchased by private subscription and be utilized in a decorative scheme for Bryant Park. It is suggested that they be set in a long row or peristyle along the westerly edge of Bryant Park, overgrown with vines and flowers, separating the avenue and elevated railroad from the park. New York has very little decorative work than does not serve a strictly utilitarian purpose, and this scheme would seem to commend itself. Under proper supervision excellent use could be made of much of the stone work from demolished buildings that now finds its way to the scrap-heap. When the old Tombs building was torn down, it was proposed to use the columns and the portion of the portico as a peristyle in one of the parks. Unfortunately nothing came of the suggestion. Aside from the historical associations of the building, it was an excellent example of Egyptian architecture and would have had a quaint and curious interest in one of the public parks.

Working the Granite for London Bridge.

Announcement has already been made in these columns that the granite to be used in widening London Bridge will be taken from the same quarries from which the original material of the structure was obtained. These are the famous Dartmoor quarries which have been worked without stopping for nearly a century. Stone for the addition to the bridge will be worked both at the quarries and in London, about 500 men being employed. Six hundred coping stones will have to be dressed into shape, each one weighing three tons. In view of the magnitude of the work improvements will be instituted at the quarries. Steam drills will be used and blasts will be fired by electricity.

Limes and Cements

Marsh & Co., whose plant at Gypsum, three miles east of Port Clinton, O., was recently absorbed by the United States Gypsum Co., had an enviable record for retaining faithful employes long in service. There were thirty-one men who had been in the employ of the company for periods ranging from six to forty-five years, two of them having been steadily employed for the longest term.

Excellent progress is being made on the new cement plate at Hudson, N. Y. A cableway is being installed to carry the limestone and clay from Becraft Mountain to the works. It is an overhead cable two and a quarter miles long with a capacity of 120 tons an hour.

Messrs. McLoon & Case, who will manufacture lime from the famous McLoon quarries, near Rockland, Me., are installing the latest improved machinery.

The Portland Cement Company's works at Colton, Ore., are being enlarged.

The plant of the National Portland Cement Company at Durham, Ont., is being rapidly pushed under the direction of W. B. Bogardus, chief engineer. When the works are completed they will be among the largest in the world.

The United States Gypsum Co., otherwise known as the gypsum trust, which combines nearly forty mills and mixing plants, has issued a prospectus. This gives the estimated output for 1902 as 652,000 tons and the estimated profits at $1,226,000.

A. J. Voight, of Armington, Mont., has completed a stucco mill near that place. It has a capacity of thirty tons per day, and the product has already been sold for a considerable time in advance.

The Oklahoma Stone Manufacturing Company, of Oklahoma City, has been incorporated with a capital stock of $50,000 to manufacture hollow cement bricks. The incorporators are: William Ask, H. H. Bickford, Alva; J. M. McCormick, Oklahoma City; C. W. Ransom, Perry.

The Texas Cement & Plaster Company, of Oklahoma City, has been incorporated with a capital stock of $100,000. The incorporators are: S. M. Gloyd, of Oklahoma City; Thomas McNeil, of Ferguson; J. D. Hibbetts, of El Reno; W. A. Campbell and James H. Rodgers, of Holden, Io.

The Wellston Portland Cement Company have sold their big mill at Eliza, O., to the Lehigh Portland Cement Company, of Allentown, Pa. It is said that the capacity of the plant will be doubled.

The Catskill Cement Company is having a large addition made to its plant at Smith's Landing, N. Y.

The Stewart Iron Company, Ltd., of Sharon, Pa., will erect a plant for the manufacture of cement from furnace slag.

The Badger Cement Sidewalk Company has been incorporated in Milwaukee, with A. George Harper, president and treasurer, and B. F. Sanders, secretary. The company has opened an office at 111 Mason street, and will do all kinds of cement and concrete work.

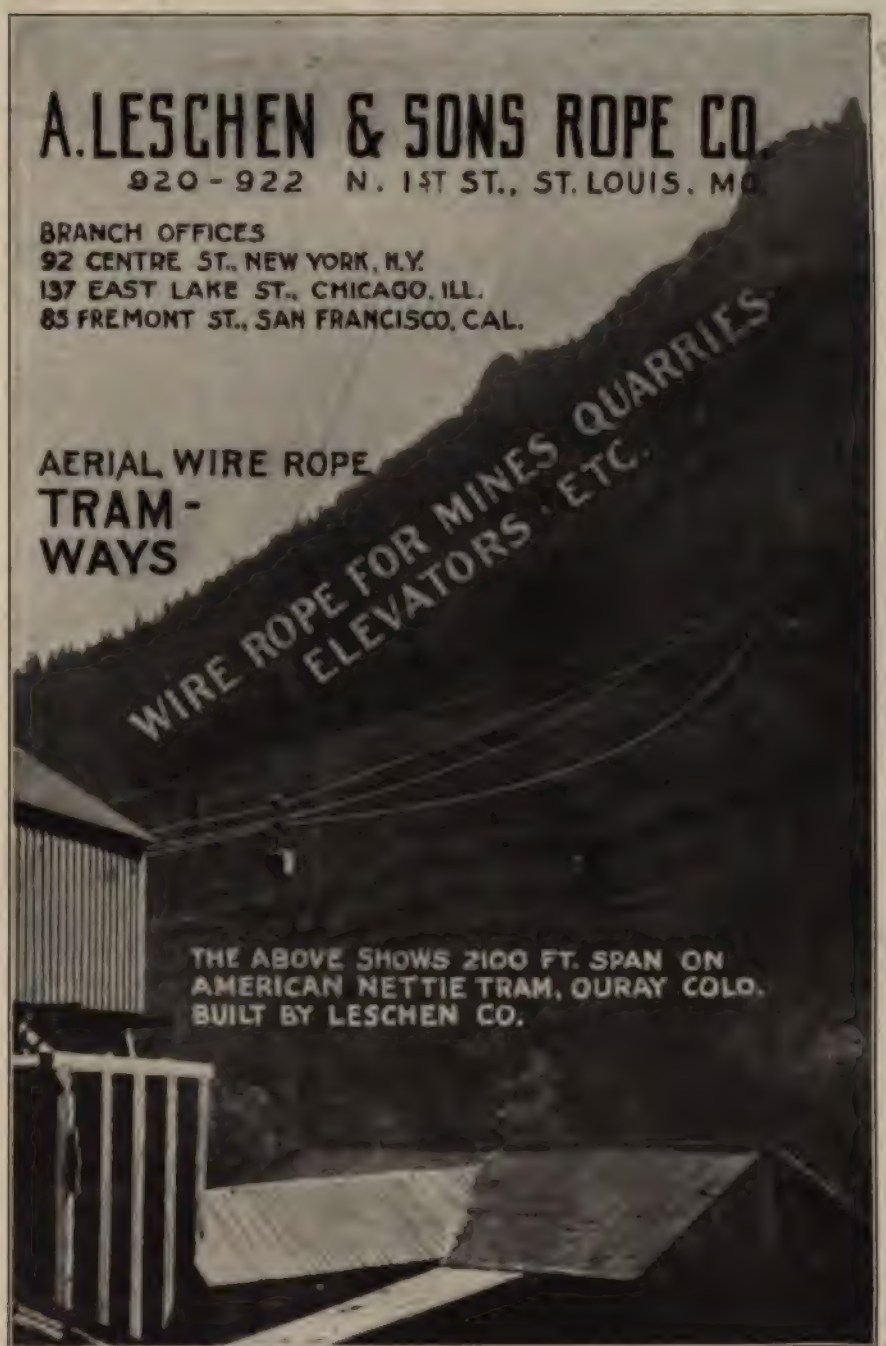
Messrs. Waycott & Sweeney are planning the erection of a Portland cement plant at Colorado Springs, Col.

Since last writing there has been considerable trouble in the labor field. This was mainly at Glens Falls, N. Y., and among the lime workers at Marblehead, Wis. At the latter place there was serious fighting, and the sheriff had to call out a large force of deputies.

The Western Massachusetts Lime Company has been incorporated under the laws of Connecticut, with a capital stock of $1,500,000. This is a combination which expects to take in all of the lime companies in Massachusetts and Connecticut, except those at Lee and Cheshire.

The Pacific Coast Gypsum Manufacturing Company owns an immense deposit of pure gypsum on Chicagoff Island in Alaska. The quarries are on tidewater, and it is said the product can be quarried for less than $2. A factory will be erected at Tacoma, and the product will be manufactured into land plaster and plaster of paris. The officers of the company are Richard Vaeth, president; F. T. Houghton, secretary; W. D. C. Spike, treasurer, and A. C. Little, general manager.

The New England Lime Company, of Millerton, Dutchess County, N. Y., has been incorporated with capital stock of $1,500,000. The directors are: Graham Sumner, A. P. Bartlett, Sidney P. Cooper, Michael Gavin 2d, Mark Hyman, Harold Walker, Alfred L. Curtiss, New York; J. Clinton Walker, Ross A. Mackey, Brook-


A. LESCHEN & SONS ROPE CO.
920-922 N. 1ST ST., ST. LOUIS, MO.
BRANCH OFFICES
92 CENTRE ST., NEW YORK, N.Y.
137 EAST LAKE ST., CHICAGO, ILL.
85 FREMONT ST., SAN FRANCISCO, CAL.
AERIAL WIRE ROPE
TRAM-
WAYS
WIRE ROPE FOR MINES QUARRIES
ELEVATORS, ETC.
THE ABOVE SHOWS 2100 FT. SPAN ON
AMERICAN NETTIE TRAM, OURAY COLO.
BUILT BY LESCHEN CO.

lyn; Thomas M. Day, Jr., Plainfield, N. J., and John J. Treacy, Jersey City.

The Hecla Cement and Coal Company has about completed its immense plant at Bay City, Mich. Although the plant has a capacity of 2,000 barrels a day, the company will probably begin with an output of only half that amount.

The White Star Portland Cement Company, of Detroit, which is to operate in Benzie County, has increased its capital stock from $10,000 to $1,500,000.

Work is progressing rapidly on the plant of the Atlas Portland Cement Company, at Hannibal, Mo. Fourteen buildings are either in process of construction or have been completed. About 200 feet of the wall of one of the kilns recently caved in and did considerable damage.

Since the gypsum quarries and the plants for the manufacture of plaster have been largely absorbed by the United States Gypsum Company, the question of raw material has become one of interest for the independent companies. They are prospecting for suitable veins of gypsum, especially in the district between Sandusky and Port Clinton, O. This entire territory seems to be rich in material that has not yet been touched.

The directors of the Southern States Portland Cement Company have contracted for more than $200,000 worth of machinery for their plant at Rockmart, Ga., to be delivered in December and January when the buildings will be completed to receive it. The plant will have a capacity of 1,600 barrels a day.

Simon Kline, of Bunker Hill, Va., has purchased 150 acres of limestone land along the Potomac Valley Railway, and will open quarries and erect lime kilns.

The Montana Aluminum Plaster Company has been organized at Armington, Mont., by Andrew and Josephine Voight and Fred J. Smith, with capital stock of $30,000. The company owns a property near Kibbey, where it will mine gypsum and manufacture stucco.

The Lagarde Lime and Stone Company, located near Gadsden, Ala., is turning out 400 barrels of lime a day. The output of the lime works is used during the winter in refining sugar.

The New England Lime Company, recently incorporated under the laws of Connecticut with a capital of $150,000, and representing the merger of eleven lime manufacturing concerns in Connecticut, Massachusetts and Vermont, has elected the following officers: President, Charles E. Griffing, of New Milford, Conn.; vice-president, William E. Canfield, of East Canaan, Conn.; secretary and treasurer, Arthur P. Freeman, of Canaan, Conn.; superintendent of Massachusetts district, David Follett; superintendent of Canaan district, Wallace Canfield; superintendent of New Milford district, Andrew N. Griffing. The headquarters of the combine are located at Canaan. During 1901 the companies included in the trust produced 500,000 barrels of lime, but it is expected that under the improved methods of manufacturing and marketing which the consolidated corporation will introduce the annual output will be increased to 750,000 barrels.

The West Virginia Lime and Cement Company, of Burlington, W. Va., has been incorporated with a capital stock of $250,000. The incorporators are: Henry E. Weaver, C. A. Bickett, C. E. Ferguson, Henry L. Steen, of Chicago, and Israel E. Robertson, of Grafton, W. Va.

The new cement plant at Portland, near Florence, Col., is being pushed, and it is expected that it will be ready to turn out the finished product in September.

The Farnum Cheshire Lime and Cement Company will install a cableway at its plant in Cheshire to carry stone from the quarries to the kilns.

Fred Markland, a farmer residing just outside the city limits of Auburn, Neb., struck a ledge of high grade gypsum while digging a well.

The Anniston Lime and Stone Company have purchased a tract of land at Tredegar, Ala., and will erect a plant larger than their present one at Cobb City. Four large modern lime furnaces will be erected.

The Consolidated Rosendale Cement Company, which was incorporated under the laws of New York in January last, with $1,500,000 authorized capital stock, of which $1,000,000 is 7 per cent. non-cumulative preferred, has acquired the following companies, which embrace all, except one, of the leading Ulster County cement properties: F. O. Norton Cement Company, Lawrence Cement Company, Newark and Rosendale Lime and Cement Company, New York and Rosendale Cement Company and the Hiram Snyder Company. This gives the company a capacity of 3,500,000 barrels a year.

The F. W. Wait Lime Company, of Glens Falls, N. Y., has been incorporated with capital stock of $50,000. The directors are: Frank W. Wait, Le Roy C. Wing and Herbert J. Russell. The company has purchased the quarries of the Jointa Lime Company, and will erect new kilns.

Contracts and Building

Government Work.

East Haven, Conn.—Government engineers have made a report recommending the Secretary of War to issue an order compelling the town of East Haven and Branford, the Tide Water Trap Rock Company and the dike company to remove the present bridge between East Haven and Branford and to begin work on a new draw bridge within three months.

Georgetown, S. C.—A Federal building will be erected here at a cost of $100,000, and one at Spartansburg at a cost of $60,000.

Muskegon, Mich.—A Federal building, costing $75,000, will be erected here.

Sturgis, S. D.—The Army Post at Fort Meade will cost in the neighborhood of $100,000.

Washington, D. C.—A bill is before the House of Representatives for a bridge across the east branch of the Potomac River from the foot of Capitol street to Congress Heights. The work is to be done by the district commissioners at a cost not to exceed $500,000.

Washington, D. C.—A bill has been introduced in Congress for the erection of a $5,000,000 patent office building and Hall of Inventions.

Washington, D. C.—The Senate Committee has reported favorably a bill for rebuilding the aqueduct bridge here. The sum of $100,000 is appropriated. The cost of the bridge is limited to $940,000.

Washington, D. C.—Work will be begun very soon on the new War College, which will cost about $400,000.

State, County and City Buildings, Hospitals, etc.

Albany, Ga.—The plans of Lockwood Brothers, of Columbus, have been accepted for the new $40,000 court house to be erected here.

Baltimore, Md.—A surgical building five stories in height will be erected by the Johns Hopkins Hospital after plans by George Archer.

Benton, Ark.—A two-story court house, of pressed brick and cut stone, will be erected here at a cost of $30,000.

Boston, Mass.—Alterations and improvements in the State House are to be undertaken as soon as the Legislature adjourns. The east door, under the original structure of 1795, will be torn out and a new white marble entrance will be built with colonnade and portico to correspond with the entrance to the new part from Bowdoin street. There will also be a winding marble stairway to the east entrance.

Caledonia, Minn.—A County poor house will be erected after plans by Schick & Roth, La Crosse.

Chicago, Ill.—Following the example of New York, Chicago is contemplating the erection of a subway covering the entire downtown district. It is estimated that this will cost between $40,000,000 to $50,000,000, and will take fifteen years to complete.

Elkins, W. Va.—Senator Davis will erect a hospital here after plans by Charles E. Cassell. It will be octagonal in shape, each side being 24 feet in length. It will be of brick with native sandstone trimmings and will cost about $35,000.

Frankfort, Ky.—A cell house costing $40,000 will be built at Eddyville Prison.

Marshalltown, Ia.—St. Thomas Hospital, costing $25,000, is to be erected here.

Milford, Mass.—It is said that a new building, costing $50,000, will be erected for the Milford Hospital Association by private donation.

Moncton, N. B.—A new hospital of brick and stone will be erected here after plans by F. M. Brodie.

Munhall, Pa.—A new municipal building is to be erected here.

New York, N. Y.—A new hospital of brick and Bedford stone, costing $180,000, will be erected by the French Benevolent Society on West Thirty-fourth street.

Ortonville, Minn.—A new city hall is to be erected here after plans by Freeman D. Orff.

Sherbrooke, Quebec.—The city proposes to purchase a water power and establish an electric light plant.

South McAlester, I. T.—The Catholic Sisters of Indian Territory will erect a hospital in McKenna Heights at a cost of $35,000.

Schools, Colleges and Libraries.

Chatham, Ont.—A public library will be erected after plans by J. L. Wilson & Sons.

Davenport, Ia.—A chapel and gymnasium buildings will be erected at St. Katherine's Hall.

Farmville, Va.—An academic hall will be built at the Female State Normal School, costing $25,000.

Gaffney, S. C.—The Winnie Davis Hall of History will be erected at Limestone College.

Gainesville, Ga.—Brenan College will build a library and extension at a cost of $25,000. Plans by Butt & Morris.

Gainesville, Ga.—A school building to cost $20,000 will be erected here.

Greensboro, N. C.—The State Normal Industrial College will erect a students' hall at a cost of $20,000.

Hoboken, N. J.—A $75,000 school will be erected at Seventh and Adams streets after plans by Robert Dixon, Jr., Union.

Jackson, Miss.—The University of Mississippi will erect new buildings at a cost of $65,000.

Mannington, Va.—The new school to be erected here will cost $75,000.

Marinette, Wis.—All of the bids for the library building exceeded the architect's estimates by $8,000, and new ones have been called for.

Memphis, Tenn.—Two new public school buildings will be erected here at a cost for the two of nearly $50,000.

Milton, Mass.—A public library, to cost $50,000, will be erected here.

New Haven, Conn.—The contract for the new brick and stone addition at Yale has been awarded to H. Wales Lines & Co., 134 State street.

Oxford, O.—Miami University will erect a dormitory costing $45,000.

Red Wing, Minn.—The Carnegie-Lawther public library will be of brick and Bedford stone. Plans are just completed by A. F. Gauger, St. Paul.

Seattle, Wash.—A new school will be erected on Boren Avenue, costing $35,000.

Sioux City, Ia.—Three new school buildings are to be erected here.

Springfield, N. D.—A new Indian school is to be erected here, costing $15,000.

Springfield, O.—Plans are being drawn for two schools to cost about $20,000 each.

Syracuse, N. Y.—Work has been delayed on the Carnegie library and David Murphy, the contractor, declares that it is due to the delay in receiving the limestone from Indiana. Under contract all of the stone is to be delivered before August. Unless it is received by that time, it will be difficult to inclose the building before winter.

Waterloo, Ia.—A number of new buildings will be erected at the State Normal School at a total cost of $250,000. These will include a chemistry building, a library and two gymnasiums.

Winchester, Mass.—A high school to cost more than $100,000 will be erected here.

Churches, Convents and Synagogues.

Asheville, N. C.—The Central Methodist congregation will erect a $50,000 church after plans by R. H. Hunt.

Atlanta, Ga.—St. Mark's Methodist Church on Merritt Avenue will be built entirely of stone and will cost about $60,000. Plans by W. F. Denny.

Baltimore, Md.—The Asquith Presbyterian congregation will erect a new church, ninety feet square, with two towers on Asquith street and North avenue. Plans by Glidden & Myers.

St. Paul's Roman Catholic Church will be erected at Olive and Caroline streets at a cost of $80,000. It will be built of Port Deposit granite and there will be a high tower. Plans by Thomas C. Kennedy.

Beaumont, Tex.—A $40,000 Baptist church will be erected here.

Birmingham, Ala.—R. H. Hunt, of Chattanooga, Tenn., has prepared plans for a $40,000 brownstone church to be erected by the First Baptist congregation here.

The First Christian congregation will erect a new church at a cost of about $27,000. Plans are being prepared by D. A. Helmich.

Chattanooga, Tenn.—A new Jewish synagogue will be erected on Frank street.

Cleveland, O.—The Unity Society will erect a new church after plans by F. S. Barnum & Co.

Meridian, Miss.—The Episcopalians will erect a $30,000 church.

Newport News, Va.—The First Baptist Church, Rev. J. W. Porter, pastor, will erect one of the handsomest churches in the South at a total cost of about $60,000.

Oskaloosa, Ia.—All of the bids for the Y. M. C. A. building were rejected because they were too high, and the plans are being revised.

St. Paul, Minn.—The Mt. Zion Hebrew congregation will erect a temple on Holly avenue, costing $50,000.

Salt Lake City, Utah.—The First Pres-

byterian congregation will erect a new church after plans by W. E. Ware.

Spartanburg, S. C.—Plans have been accepted for the new brick and stone Baptist church. J. C. Rigby, chairman.

Summit, N. J.—The First Baptist congregation will erect a brick and stone church at a cost of $30,000. J. N. Cady, architect.

Toledo, O.—St. Mary's Roman Catholic Church will erect a parochial school, costing about $100,000. Plans by Bacon & Huber.

Business Buildings, Theatres, Hotels, Society Halls, Etc.

Atlanta, Ga.—The St. Louis Car Wheel Company, of St. Louis, will build a wheel foundry here at an estimated cost of $75,000. The main building will be 230x95 feet, with wings for the engine and boiler house.

A. G. Rhodes will build a handsome new residence here in which the stone work alone will cost $25,000.

Baltimore, Md.—An addition will be erected to the Safe Deposit and Trust Company's building on South street. It will be of brick and Cheat River bluestone. It will cost $100,000. Plans by Baldwin & Pennington.

Beloit, Wis. — The Fairbanks-Morse Company will erect a foundry here, costing $125,000.

Berkeley Springs, Va.—Jackson C. Gott, of Baltimore, is preparing plans for the $200,000 hotel which Mr. Calvin Chestnut and others are erecting here.

Brooklyn, N. Y.—The Orpheum Company will erect a $125,000 theatre on Manhattan Avenue. Plans by J. B. Elpatrick, New York.

Canton, O.—The United States Steel Company, of Canton, will be incorporated to build an open-hearth furnace here.

Chester, Pa.—The Howery Manufacturing Company will build an iron works here, the main building to be 54x106 feet. The company is capitalized at $200,000.

Cold Springs, Minn.—The State bank will erect a new bank building here.

Colorado City, Co.—The U. S. Smelting Company will build a $1,000,000 smelter here.

Des Moines, Ia.—Dr. W. O. Coffee will erect a stone mansion on West Grand Avenue, costing $60,000. It will be four stories in height.

The Rumley Manufacturing Company, of La Porte, Ind., will erect a large machinery warehouse at Fifth and Vine streets. Plans will be prepared by Hallett & Rawson of this city.

Duluth, Minn.—C. A. Congden will build a stone residence, after plans by C. H. Johnson, of Minneapolis. Cost, $100,000.

Elgin, Ill.—A Masonic Temple will be erected here at a cost of $30,000 after plans by D. E. Postle, Chicago.

Greensboro, N. C.—It is expected that Moses & Caeser Cane will erect a $1,000,000 cotton mill here for the manufacture of colored goods.

Kansas City, Mo.—John Taylor will erect an office building at Tenth and Baltimore streets, costing $500,000.

Lynchburg, Va.—Jacob Wells will erect a theatre, costing about $45,000, after plans by Frye & Chesterman.

Nashville, Tenn.—J. E. R. Carpenter, of Norfolk, Va., is completing plans for the Methodist Printing House to be erected at a cost of $150,000.

The National Casket Company will erect a coffin manufacturing plant at East Nashville at a cost of $75,000.

New Orleans, La.—The Hibernian Trust and Banking Company will erect a twelve-story building. Plans by D. H. Burnham. Cost about $300,000.

Omaha, Neb.—The Masons are contemplating the erection of a temple on Farnam street at a cost of $250,000.

Pine Bluff, Ark.—A temple will be erected by the colored Masons here. It will be four stories, 154x50 feet, and will cost about $40,000.

Port Washington, Wis.—The Ocaukee County Malting Company will build a $50,000 malt house and elevator.

Raleigh, N. C.—There is talk of building a Labor Temple here.

Richmond, Va.—W. H. Zimmerman will erect a seven-story brick and stone hotel building at Seventh and Broad streets, at a cost of about $350,000.

St. Paul, Minn.—The Modern Woodmen will build a brick and stone lodge building on Ninth and Exchange streets.

An additional story with cut stone front will be added to the Germania Life Insurance Annex on Fourth street. Plans by J. Walter Stevens.

Sault Ste. Marie, Mich.—Blumrosen will build a brick and stone block at a cost of $25,000 after plans by Edward Demar.

Savannah, Ga.—The Germania Bank will erect a handsome building on Congress and Bull streets, costing $125,000. Plans by Norman & Brice, Atlanta.

Sedalia, Mo.—The local Masons will erect a new temple.

Sheboygan, Wis.—An opera house will be erected here, costing about $30,000.

Trenton, N. J.—The J. L. Mott Iron

Works, of New York, will erect a new plant here.

Washington, D. C.—William Souder will erect four three-story houses at Roanoke and Fourteenth streets. The entire fronts will be of Indiana limestone. The Colorado Building is an office structure to be erected by Thomas F. Walsh at Fourteenth and G streets. It will be the largest building of its kind in Washington. The first three floors will be of light stone, and there will be stone trimmings throughout. The style of architecture will be Italian Renaissance with elaborate details.

Winston, N. C.—An Elks home is planned for this place at a total cost of $35,000.

Bridges, Depots and Railroad Works.

Albion, Ind.—Noble County will erect a number of stone and steel bridges, ranging from 22 to 80 feet.

Belvidere, Ill. — The Chicago and Northwestern will build a 16 stall engine house at this place.

Black River Falls, Wis.—A large power dam will be built here by the La Crosse and Black River Falls Railway Company.

Connellsville, O.—The Baltimore and Ohio will build a 22 stall round house and a number of shops at this place.

Evansville, Ind.—A new passenger station of the Louisville and Nashville will be of brick and stone and will cost $75,000. This railroad will shortly begin work on the general shops at South Louisville, which will cost nearly $1,000,000.

Fairmont, W. Va.—The Baltimore and Ohio will erect a 2-stall round house here.

Fort Worth, Texas.—The International and Great Northern has purchased grounds here for a site for its proposed shops.

Hamilton, O.—A new freight depot will be built here by the Cincinnati, Hamilton and Dayton Railroad.

Harrisville, R. I.—A stone arch bridge will be built at this place after plans by Henry J. Bruce.

Honesdale, Pa.—It is expected that the State will build a double arch stone bridge 128 feet long over Esquinunk Creek.

Kansas City, Mo.—The city will probably take action to compel the railroads to build viaducts.

Mahanoy City, Pa.—A stone bridge will be built at D street in this city.

Manitowoc, Wis.—It is probable that a viaduct will be built over the Chicago and Northwestern tracks at Thirty-third street.

Missoula, Mont.—The Northern Pacific will build large repair shops here.

New Castle, Pa.—The Pittsburg and Lake Erie will build a large viaduct over Gardner avenue and the Shenango River.

Oneonta, N. Y.—The Delaware and Hudson shops at this place are to be enlarged and several new buildings will be erected.

Oskaloosa, Ia.—The Chicago, Burlington & Quincy will complete its extension from this city to Tracey by the middle of October. The company will build a new depot here and also one at Des Moines.

Piqua, O.—The Western Ohio Railroad Company will build a 100 foot viaduct at this place.

Pittsburg, Pa.—The Baltimore and Ohio will build a new passenger station here on the site of the old one.

Portage La Prairie, Man.—Government aid will be asked toward building a bridge over the Assiniboine.

Pottstown, Pa.—The Philadelphia and Reading will build a new passenger station here.

Sayville, L. I.—The Long Island Railroad will erect a new station at this place.

Springfield, O.—The Big Four will make elaborate improvements to its car shops here. The total cost is estimated at $750,000, of which $250,000 will be expended this year.

Stoneham, Tex.—The International and Great Northern will erect a new depot here.

Syracuse, N. Y.—The New York Central is contemplating extensive improvements here, including a Union central passenger station on the north side.

Utica, N. Y.—The Utica and Mohawk Valley Railroad will build new shops here, 225x54 feet. The masonry contract has been awarded to Griffith & Pierce, of Utica.

Vicksburg, Mich.—The Grand Trunk and Grand Rapids and Indiana Railroad will build a new station at this place.

Washington, Pa.—The Pennsylvania Railroad proposes to build a new passenger station here.

Winnipeg, Manitoba.—The Canadian Northern will make improvements to its shops at a cost of nearly half a million dollars.

William Spangler, of Red Lion, Pa., has reopened the High Rock quarries, near York. These quarries were worked on a small scale for two years, but now it is proposed to carry on the business more extensively.

Trade Notes

"Coaling at Sea" is the title of an illustrated catalogue issued by the Lidgerwood Manufacturing Company, of 96 Liberty street, New York. This is a description of the Lidgerwood-Miller Marine Cableway as installed on the U. S. Battleship Illinois by this company. The marine cableway was patented by Spencer Miller, C. E., and the patents are controlled by the Lidgerwood Company. The Illinois is one of the finest of the United States battleships and is fully equipped with this apparatus, which was accepted by the Navy Department after severe tests. The original marine cableway was installed on the U. S. Collier Marcellus, and upon its fifth sea trial it delivered to the U. S. battleship Massachusetts in a sea a little heavier than moderate, over twenty tons per hour. The towing speed was from five to six knots. The second apparatus was placed on the British Collier Muriel, and this succeeded in delivering to H. M. S. Trafalgar from thirty-five to forty tons per hour in a moderate sea and heavy gale of wind. The first warship to be completely equipped with a marine cableway is the Illinois. This will permit the battleship to take coal at sea from any vessel with a mast that it may meet in any quarter of the globe. When it was first suggested to place the operating winches and equipment for a marine cableway on the warship, great objection was urged on the ground that the vessel was already overloaded with machinery, and that if it was compelled to carry this device on board other essential machinery would have to be displaced. Upon the superstructure deck of the Illinois there were already two deck winches. These were removed and two new winches adapted to operate the cableway as well as for all ordinary service took their place. These occupied precisely the same bed and used the same foundation bolts as those they displaced. No additional deck space was occupied and the entire equipment was conveniently set without being in the way. There are various improvements in the matter of elevating and carrying the load and depositing it upon the warship. Formerly the bags of coal were dropped through a large canvas chute. Now the load starts from the collier on a down-hill route and after it passes the center of the span it is lowered until it just trails on the deck of the warship. With the new apparatus sixty round trips should be made an hour the same as before, but the amount of each load will be greater, so that at least forty tons per hour should be trans-shipped. The pamphlet is an interesting one, and has attractive illustrations. A copy of this or of any of the Lidgerwood catalogues will be sent to any interested person upon request.

The Macomber & Whyte Rope Co. have just issued Catalogue B—1902, which gives complete information with reference to the various grades of wire rope manufactured by them. The Macomber & Whyte Rope Co. also manufacture the Hallidie Tramway, and this specialty is also described and illustrated. Catalogue B also contains lists on all wire rope fixtures, wire rope sheaves for the transmission of power, hoisting sheaves, wire rope blocks, etc. A complete table covering transmission of power by wire rope, and "How to Splice Wire Rope" is also fully described. This company's factory is located at Coal City, Ill., and they have met with great success in the manufacturing business. This is particularly true with reference to the "Monarch" brand, which is largely used by mines, quarries, dredges, contractors, and in fact everywhere that a strictly high grade rope is required.

The Harrison Supply Co., Nathan C. Harrison, general manager, 32 Indian Wharf, Boston, Mass., has issued a little booklet devoted to their abrasives and polishing materials. This is a neat publication and it is of particular value to all stone men because of the many useful hints and suggestions that it contains. It is care in these small matters, leading to great economies, that frequently means all of the difference between success and failure in a business. The particular subjects treated in this little booklet, which will be sent to any address upon request, are chilled steel shot, carborundum, emery, putty powder, felt, steel and fiber brushes, etc.

The condition in the labor field the past month has not been very satisfactory. There are strikes in many wide and scattered fields, and although none of them has yet attained to any very great propor-

tions they all serve to emphasize the general spirit of unrest that is found throughout the stone trade. After a long conference the strike at Cape Ann, which has been in operation for a month has been settled. An agreement was reached by concessions on both sides. The paving cutters are granted an advance from $1 to $1.50 per thousand for the present, with a promise of an additional advance in a year's time if the business will warrant, on Boston, New York and Philadelphia blocks to meet the original demands of the quarrymen. The men working for the American Granite Company, at Portland, Me., struck for an advance from $1.50 to $1.75. At Stonington four hundred quarrymen are out of work, and most of the native laborers have been replaced by Italians and Finns. At Clinton, Mass., the quarrymen at work getting out stone for the big dam struck for an increase of 25 cents a day. An agreement was reached between the quarry owners and the work men at Alton, Ill., whereby the latter are to receive $2 for a nine hour day. There was a two weeks' strike in one of the sheds at Northfield, Vt., the terms of final settlement not being made public. In New York all of the stone yards were tied up because of a quarrel between the Journeymen Stonecutters' Union and the Machine Stone Workers' Union. The Journeymen are trying to get machine work under their control on the ground that it is skilled labor. There was a strike among the marble cutters and setters at Marion, Ind., because of the employment of non-union carpenters. The marble cutters employed by W. J. Grant, of Milwaukee, struck, and it is claimed that men working for this contractor in other cities will also go out. One hundred and fifty stonecutters at St. Johns, N. B., went out on a strike because their demands for a restoration of the old scale, which was reduced ten per cent. seven years ago by mutual consent be restored, was not granted. A speedy settlement is expected.

The Wooster Stone & Sand Company of Wooster, O., has been incorporated with a capital stock of $25,000. The company will do a general stone and sand business for all purposes and will also furnish the Pocock Glass Company with sand for their works, which are soon to be erected at Wooster. The officers of the company are: President, W. J. Mullens; vice-president, John McSweeney; secretary, C. A. McDonald; treasurer, L. P. Ohliger, all of Wooster, and manager, Z. T. Duer. The company will operate the quarry of the Killbuck Brownstone Company, of which Mr. Duer was one of the owners and manager. The stone from this quarry has been used for building purposes in many States and enjoys an excellent reputation.

The Canadian Tariff on Cement.

Manufacturers and merchants throughout the Canadian Provinces are becoming greatly dissatisfied with the present condition of the Canadian tariff, and deputations from the various industries are waiting on the Dominion Government and requesting some modifications of the duties. The delegation from the Portland cement manufacturers recently waited on the Government and stated that over $4,000,000 are invested in the production of cement, and the industry gives employment to some 2,000 persons. The total capacity of the works in operation and under construction is about 1,100,000 barrels per year. They say that the American manufacturers, owing to their immense plants, can produce on a larger scale and more cheaply than the Canadians, and that they are making a slaughter market of Canada, in which operation they are aided by the freight rates on the other side of the line, which are lower per mile per car by from 50 to 75 per cent. This disadvantage would be, to some extent, counterbalanced by a readjustment of the duties. The tariff changes asked for, they say, will not enhance the price of cement in that country. Owing to the existence of natural deposits all over the country, anything in the form of a combine would be frustrated by the starting of new works. They also say that from thorough tests, it has been found that the Canadian cement is the best in the world and that the output of the factories at present in operation or now being built would more than meet the demand.

The deputation was given an assurance that its views would receive due consideration.

Cement Makers in Austria Unite.

Consul Frank W. Mahin writes to the State Department, from Reichenberg, Austria, as follows: A union of Austrian Portland cement manufacturers has been effected. It is complained, however, that the recalcitrance of a few outside firms makes it very difficult to accomplish the purpose of the combination—to check a further fall in prices by judiciously dividing the markets among the parties to the agreement. But it is hoped that the outsiders may be gradually forced into line, as they come to realize that their interests are thereby subserved.

SITUATIONS WANTED.

Advertisements under this heading inserted for subscribers to STONE *free of charge. Advertiser must send 25 cents to pay postage, if replies are to be addressed in care of* STONE. *Rate to non-subscribers, 10 cents a line each insertion.*

WANTED—A position as foreman or superintendent of a cut stone plant. Thoroughly understands all kinds of stone working machinery, setting out work, etc. Have the best of references from firms for whom the advertiser worked eight and four years respectively. Address "Reed," care STONE Magazine.

WANTED—The advertiser is open for position as foreman. Twenty years in the business, five years running a steam stone yard. Am a practical stone cutter and mason; am posted on plans, pattern-making, best methods of getting out work, and estimating on cut stone work and masonry. Best of references. Address Henry Kershaw, 71st St. and Buist Ave., Philadelphia, Pa.

WANTED—A position, to take charge of a stone or marble plant. Twenty-five years' experience in quarrying and milling. Thoroughly conversant with machinery and best methods for developing and operating quarries, mines and mills. Address American, care STONE Magazine.

HELP WANTED.

Advertisements inserted in this department for 15 cents a line each insertion.

WANTED—Draftsman for interior marble work and bilg; one having some experience as salesman preferred. The Schilling Co., Albany, N. Y.

WANTED—By a monumental firm of standing, a competent, energetic salesman of good address. A young man preferred. Must be well recommended and be capable of handling the best class of trade. A good salary and territory will be given the right man. Address "Energy," care STONE Magazine.

WANTED—Competent office man for marble works at quarries; must be a good draughtsman, experienced in computing estimates on all architectural marble, both interior and exterior; willing to live in the country; single men preferred. Apply, stating qualifications and salary expected, to Geo. B. Sickels & Company, Tate, Ga.

WANTED—Foreman for quarry crew, must be competent, energetic, and not over 35; familiar with derrick and quarry machinery, also able to handle men to advantage. Permanent position, with fair salary to start on, and good prospects for the future. Address "West," care STONE Magazine.

TO SELL. TO BUY. TO EXCHANGE.

Advertisements inserted in this department for 15 cents a line each insertion.

BUSINESS OPPORTUNITY.

An unusual opportunity is afforded for a practical and experienced Quarryman or cut stone Contractor to become associated in operating a Marble Quarry located in the northern part of New York. A solid deposit of sound marble appears on the surface and preliminary developments demonstrate an inexhaustible supply of both white and mottled marble. There is track connection with main line of railway, and product of quarry can be delivered at a low price. The quarry has been opened up by channeler, producing blocks of any size required. Some capital is now required to erect a sawmill, as there is quite a demand for such product. If preferred a corporation will be organized to conduct the business. Address F. W. HOYT, Publisher STONE.

FOR SALE AT A SACRIFICE.

A brownstone quarry, not far from Chicago. Address "Secretary," Builders & Traders Exchange, Chicago, Ill.

FOR SALE—Some fine pink granite quarries located near the railroad in North Carolina. The granite is a first-class building and monumental stone and is easily accessible. Good chance for a firm that handles large contracts in building and monumental work. Address the publisher of this Magazine.

A GRANITE QUARRY IN NEW YORK STATE.

A splendid opportunity for the development of a Granite Quarry in the eastern part of New York State, 75 miles from New York City; nearest point to R. R. 2½ miles. Easy grade, 25 acres exposed granite in sight free from minerals and surface seams. Has bed seams and rift, 5 great spurs, each different in color and texture, from fine grained dark blue to clouded resembling marble, with similar markings and make-up of Milford, Mass.

Write to confer, to open up in first-class shape, and consider terms.

Experts report supply inexhaustible, best up-to-date building stone—uniform and warm color, will quarry any dimension, breaks across the grain, chips off good, holds a corner, cuts, letters, takes a good polish, and granite enough to more than supply New York State and cities. Communicate with owner.

THEODORE WING, Plainfield, Conn.

MACHINERY.

FOR SALE—A splendid Aveling & Porter Road Roller, 15-ton, perfect condition, all complete, immediate shipment, inspection here. SPECIAL PRICE $900 cash, if taken promptly.

WILLIS SHAW—CONTRACTORS' MACHINERY

CHICAGO.

Contractor's Plant FOR SALE.

Seventy-five thousand feet wire rope, good as new. The lengths of these ropes will run from 150 feet up to 1,000 feet long. The sizes are ½, ⅝, ¾, 1, and 1⅛ inches. Iron and wooden blocks all sizes; canvas covers; 500 army tents; chain slings; 2,000 feet 3½ inch fire hose; crowbars; lanterns; iron buckets; 1,000 feet galvanized pipes, all sizes; 20 old canvas sails; Jenkins valves. These goods will be sold separate and at a bargain. EDWARD J. KANE, 260 Front St., New York City.

$500.00 CASH.

This sum will buy a good blue stone quarry of 30 acres at Summit, Schoharie County, N. Y. Address T. H. MAGILL, Schenectady, N. Y.

BOOKS

FOR QUARRYMEN, STONE-WORKERS, CONTRACTORS, ARCHITECTS

		Postpaid.
Cummings	American Cement	$3 00
Redfern	Ancient Sculpture	2 00
Ames	Alphabets	1 50
Richardson	Architectural Modeling	75
Hendricks	Architects' and Builders' Guide	5 00
Kidder	Architects' and Builders' Pocketbook	4 00
Cain	A Theory of Voussoir Arches	75
Allen	A Theory of Arches	75
Baker	A Treatise on Masonry Construction	5 00
Guttman	Blasting	3 50
Andre	Blasting Rock	3 00
Burgoyne	Blasting and Quarrying	75
Van Nostrand	Builders' and Contractors' Price Book	1 40
Trautwine	Civil Engineer's Pocketbook	5 00
Saunders	Compressed Air Production	1 00
Richards	Compressed Air	1 50
Glynn	Cranes and Machinery	75
Wegmann	Design and Construction of Masonry Dams	5 00
LeConte	Elements of Geology	4 00
Haswell	Engineers' and Mechanics' Pocketbook	4 00
Johnson	Engineering Contracts and Specifications	4 00
Nash	Expeditious Measurer	1 60
Bertholet	Explosives and Explosive Compounds	75
Sturges	European Architecture	4 00
Grimshaw	Engine Runners' Catechism	2 00
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XXIV. No.

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ing system. By this means a shaft is first sunk to the lowest point that it is desired to exploit and from there rising progressively toward the surface in extracting the slate and gradually filling in the space below with material let down from the surface for the purpose. This does away with much of the danger from falling rock, which is specially to be feared from hidden seams in the vertical walls of the huge chambers that are a feature of the descending method.

The entire annual output of France is about 600,000,000 slates, representing a value of 14,000,000 francs ($2,800,000). Nearly one-half of this output is equally divided between the quarries at Angers and those of the Ardennes basin. The department of Ardennes is in the northeastern part of France, adjoining Belgium. Like the quarries of Angers, the workings at Ardennes are underground. At each of these centers about 3,000 men are employed. The origin of the Ardennes workings is also very ancient, for in the twelfth century the workmen had already formed a fraternity under the patronage of Notre Dame de Divers-Monts. "The Quarry" gives an interesting study of these workings, which are different in some particular from any others. The system of quarrying royalties has some peculiar features, amongst which must be mentioned the condition stipulating a minimum salary for the quarrymen in the special case of contracts between the companies and the communes which own such land. Finally, in the instance of quarries situated partly under the bed of the River Meuse, the question of drainage constitutes a problem of capital importance, which has been solved in a remarkable manner in some of these quarries. The statement of all the questions relating to quarrying has recently been written in a very learned work by Mr. Watrin, Chief Inspector of Mines at Mézières. This book possesses a very original feature; it is written in a lucid and simple style by a professional man, who for twenty-five years has followed all the researches and inspected all the workings of the quarries, made plans, classed the clay-schist strata of the basin, and grouped together the somewhat confused ideas, hitherto possessed, respecting continuity of the strata and the faults which intersect their field of work. Finally, this book supplies a want in French mineral history, and a brief analysis of the leading chapters may be of interest. The preface to the volume is by Mr. Nivoit, Inspector-General of Mines, who briefly, methodically and concisely describes the formation of the *phyllades* (argillaceous schists) of the Ardennes. No one could be better qualified than the eminent Professor of Geology at the School of Road Surveyors, to present Mr. Watrin's work to the reader. In fact, Mr. Nivoit was engineer at Mézières, and in 1869 published a pamphlet entitled "Elementary Notions on the Industry in the Department of the Ardennes," which contains a monograph relating to the slate quarries connected with his district.

In the first place Mr. Watrin gives a detailed account of the formation of the strata. Some silt deposits of the Cambrian epoch, upheaved by powerful mechanical action, modified by high temperatures, laminated by earth movements, and also subjected to the action of water under pressure, have given birth to the clay schists of Fumay, Rimogne, and Deville-Montherme.

Quarrying is concentrated in these three basins. In that of Fumay-Haybes one can distinguish, at the higher geological level, the group of black strata, and below that of the violet. It is in the latter that the fine quarries of Espérance are situated, also those of Moulin-Sainte-Anne, Saint-Lambert-Bellerose, Renaissance, etc. The thickest stratum of the group is that of the Moulin-Sainte-Anne, which is about 12 meters (13.09 yds.) thick. In the Rimogne basin the strata worked are those of Grande-Fosse, the dip of which is 40 degrees, and the thickness as much as 50 meters (54.5 yds.); of Truffy, thickness 15 meters (16.3 yds.); Saint Quentin, 12 meters (13.08 yds.); Pierka, 20 meters (21.8 yds.); Richole, 15 meters (16.3 yds.). In the Deville-Montherme basin the strata chiefly worked are those of Sainte Barbe, maximum thickness, 18 meters (19.6 yds.), and Sainte Barnabé, Sainte Catharine, etc.

Quarrying is operated in chambers, following the direction of the strata, designated *ouvrages*, and receding on either side of a central inclined gallery. These successive chambers are separated by pillars, which give solidity to the working and aid removal of water. The length of the chambers measured along the dip is usually 14 meters (15.3 yds.); the thickness of the pillars is 3 meters (3.2 yds.), and in thick strata attains 10 meters (10.9 yds.). In the chambers the stratum is worked in ascending, each layer being the object of special working by inverted steps, styled "*en rehaussant*;" cutting, which bears the name of *crabotage*, is usually executed near the floor in the softest parts. To detach the blocks of slate, the dimensions of which are sometimes very considerable, the workmen cut notches with a pick above and below the chambers, across the stratum; fall of the block is then obtained either by aid of wedges or blasting. The blocks are cut up and separated into two classes, the useless schists being retained as goblin, and the pieces of slate schist put into trucks and conveyed away through the level gallery constructed at the lower part of the chamber, thence above ground through the inclined gallery or the hoisting shaft.

Drainage is one of the most important features in slate quarrying. In fact, many of the quarries run below sea-level, and are partially worked under the river Meuse. The inrush of water at the Liemery Quarry attained 500 cubic meters per day (17,655 cubic feet), and at those of Saint-Lambert-Bellerose, 300 cubic meters (10,593 cubic feet). At first the system of draining was rudimentary, and the absence of proper plant led to the abandoning of numerous quarries. Since then, however, the ingenuity of the quarryowners has succeeded in remedying the drainage question in a very suitable and original manner. In most cases the pumps have a main rod, the successive throws of which follow the deepening of the working. In 1843 a discharge gallery, more than 2 kilometers long (1.241 mile), was cut through the quartzite, which carries away the water from the quarries of Saint Quentin and Grande Fosse. Hydraulic wheels, placed on the streams of the mountainous part of the basin, drive, by aid of a set of jointed connected rods, the underground pumps of certain quarries, like that of La Richole, at Rimogne, and Saint Gilbert, at Fumay. The auxiliary system of drainage is often composed of small compressed air pumps, as at Moulin-

Sainte-Anne and La Renaissance, or again by water pressure pumps at the Espérance Quarry. Finally, underground steam pumps, as at Bacara. At the St. Joseph, Espérance, Providence, and Sainte Barbe Quarries, electric pumps have been employed for some years.

Ventilation is often defective, the quarries being, in most cases, ventilated by natural means. In summer it is sometimes accelerated by furnaces, air shafts, or fall of sheets of water into the entrance galleries. In the secondary workings fans driven by hand or compressed air are in constant use. At the Espérance Quarry successful experiments have been made with a small fan set in motion by water under pressure obtained from the delivery pipe of the pumps. Finally, since 1900 this quarry has employed a fan worked by an electric motor.

The blocks of schist hauled from the quarry, their weight being as much as 100 and 120 kilogrammes (220.5 and 264.6 lbs.), are separated in special workshops by the splitters. These workmen first utilize, in the operation styled *quernage*, the property possessed by slate of cleaving readily in a particular direction, called *longrain*. This direction coincides with that of the chief axis of the octohedral crystals of magnetic iron oxide which the slate contains. Sometimes, instead of *quernage*, a circular saw is employed to divide the slate, which involves less waste. The pieces of schist obtained in *quernage* are then split along the thickness. This work, which is executed by hand with chisels, gives sheets 2 to 5 millimeters thick (0.78 to .195 inch), from which the slate is roughed out by aid of a cutter. Dressing is completed in a special machine, a kind of die-press, set in motion by means of a pedal or a steam engine at the Moulin-Sainte-Anne Quarry. The workshops, offices and quarry of Espérance are all illuminated by electricity. Ardennes slates have exceptional qualities of hardness, lightness, solidity. As a general rule, the slate is better the greater the depth at which it is quarried. The average duration of a roof of Ardennes slates is 90 years. The weight of such a roof varies, according to the type of slate utilized, from 18 to 29 kilogrammes per square meter (39.6 to 63.9 lbs. per 1.196 square yard).

The slate workings are classed as quarries, and ownership of the land includes that of the sub-soil. This gives rise to all kinds of difficulties which have been a great hindrance to extension of the quarries. Parcelling out the land is incompatible with economic working of the schist, and, on the other hand, the exigencies of the landowner very often mean formal prohibition. The right to quarry can be obtained by buying the sub-soil, or by payment of a royalty fixed by a contract; prices are very variable, and sometimes attain 15,000 francs per hectare (£600 per 2.47 acres). As for the royalties, they are usually proportional with the number of slates made, the rate varying from the 12th to the 50th slate. Some landowners also exact, on penalty of loss of rights, a minimum annual royalty.

A SCULPTOR AT CARRARA.

LAST year Mr. Harry Hems, the English sculptor, visited Carrara after an absence of many years. While there Mr. Hems contributed a brief article to STONE, giving his impression of the place and of the changes since his former visits. Mr. Hems makes a practice of keeping a diary, and we are privileged to make the following interesting extracts from it concerning quaint scenes and customs in this center of the Italian marble industry.

"Sunday, June 16, 1901.—To-day is the great day of the feast here in Carrara. It is the anniversary of the patron saint's death (St. Cerrardo), and I have seen some of his bones exposed for veneration in the cathedral this morning. According to local tradition he was, I fear, an idle dog, who lived up in the mountains above the town, spending his time in prayer and meditation (i. e., in idleness). A woman in Carrara was mashed upon him and used to take him the food he was too lazy to work for. This incensed her husband. He became, naturally, very jealous, so, having found the man in his rugged haunts, without more ado killed him. That happened upon June 16, A. D. 663, so he (the dead one) was canonized and made a saint. It was pay-day yesterday. The men who work in the quarries and studios are mostly paid every alternate Saturday. Last night the streets were thronged with drunken men—not quarrelling or fighting as English masons and quarrymen would probably do under the same conditions, but reeling about, cuddling and slobbering each other in a maudlin sort of fashion."

"Monday, June 17.—Have been up the mountains and amongst the quarries all day. Light-colored oxen, who are shod, draw the blocks of marble in teams of twelve or more. The men who drive them sit on the yokes, kicking them in the neck and pulling their very long horns to stimulate them in their work. The blocks are got off of the carts by the help of long bars. The men, who are most athletic and thrust surprising energy into their work, pull the blocks towards them with their bars, until they are just on the edge of the wagons, and then cleverly topple them on to the ground. These wagons are very crudely and strongly built, the wheels being of almost solid construction (no spokes). It is said they are made upon precisely the same lines as wagons in use in the self-same quarries were made 2,000 years ago. When these mountaineers are lowering or raising a block, they ply their bars in unison, singing in chorus, much as sailors do pulling at ropes or lines when they chant:

Every day is like a year,
John's gone home!

or that less pathetic favorite song, whose respond is, 'Blow the man down!'

"Blocks of twenty tons or so are run along with surprising celerity. It is done in this manner: They are raised a bit in front. Then two long pieces of timber, curved up at each end, something like sleighs, are thrust under.

Oxen are now attached and skids of wood, 3 ft. or so in length and well soaped at top, are pushed in alternately. Upon these, the two runners, with the block on top of them, glide along smartly and smoothly. Of course, it takes some half dozen men to continuously shift the skids and 'keep the pot aboiling.' One carries a long bar of yellow (sometimes blue) soap—common variety—and with this he liberally greases the skids as they quickly take their turn, one after the other, under the fore and aft pieces. So active are the men with their long iron bars that by fair hand polish the latter shine bright as the stirrups of a cavalry soldier.

"Although there are a good many sawmills, with machinery worked by water wheels, sawing marble in the good old fashion—by hand—is still very general. I only saw one instance of cutting by endless wire; that was at Marina, the little seaport upon the Mediterranean Sea a few miles from Carrara. The man who was working (!) it was laid down upon the shady side of the block fast asleep! A visit to the quarries gives one the impression that a deplorable waste of material goes on at every hand. There seems quite enough lying about in the mountains, in the numerous yards, and on the waste land in front of the sea at Marina, to supply all demands without quarrying another block, big or small, for a year or two. At Marina, hundreds of marble masons find employment in roughly squaring up the blocks prior to shipment. These all work very hard and seem to be 'bustled up' by the foreman. They use points, clawed chisels, and steel-faced hammers (very rarely mallets), and, dressed in shirt and trousers only, are nearly all barefoot, moving dapperly about over the hillocks of rough marble chippings. Stonemasons going about and working barefooted, I am glad and thankful to say, are a specialty to Italy. I never saw them in any other part of the world, thank God! The miserable rates at which these poor devils are paid is simply scandalous. No wonder monumental work from Carrara floods the market everywhere, and at home in England finished work of the kind is often supplied as cheap as a block of marble fit to do the job in can be obtained from the large marble merchants of London or Liverpool. I understand from the American Consul (a very good sort of fellow) that marble masons here are only paid 1s. 7d. to 2s. 10d. a day; quarrymen, 1s. 7d. to 3s. 2½d. a day; and carvers, who, as a matter of absolute fact, can do the most beautiful monumental carving in the world and are particularly quick and expert, 2s. 5d. to 6s. 5d. a day; the clever figure sculptors, second to none in Christendom, earn from 3s. 2½d. to 8s. a day. There are two piers at Marina, very roughly built of timber, laid with railway irons almost as much out of winding as is the back of the supposed great sea serpent. There are two small cranes for lifting upon one of these, and four upon the other, one of the latter broken down. These are the only helps that exist to manual labor for loading the blocks and cases of marble on to the ships. The cemetery, when last I was here, stood upon the spot where the theatre now stands. The Italians are little respecters of the dead, it seems, and here, God's Acre has been fairly effaced from the face of the earth. The present cemetery is a mile or more out of the town, reached by a fine and almost continuous avenue of trees, whose pleasant shade is most grateful. It is walled around

and cut into terraces upon the hillside, the view therefrom of the Appenines being splendid. Perhaps it comes about that as Carrara is the tombstone shop for the civilized world, its inhabitants are fairly sick of that sort of thing. Anyhow, as a matter of fact, with almost one beautiful and costly exception, the memorials in this cemetery are of the poorest and most paltry description, mainly wood or iron crosses, dear at a few shillings apiece. I discovered one English cenotaph. It is a small black marble slab, 14 in. by 10 in., stuck against the wall in an out-of-the-way corner. The inscription thereon is cut and gilded, and reads:

"'Hannah Harrison Judd, born February 5, 1838, died February 15, 1887.

"'Lilian Judd, born September 6, 1878, died August 1, 1884.'

"Thursday, June 20.—Amongst other studios visited to-day was that of Gnio Ferinando, who calls his place 'Laboratorio di Architettura Ornamentale.' I was interested in a rather large job he has in hand for my old friend, 'Dicky' Boulton, of Cheltenham. The railway that goes up the mountains has no accommodation for passengers, and strictly confines itself to quarry work. Although it does not connect itself with the higher quarries, it goes to a considerable altitude, and by sidings is connected with most of the more important ones, the line winding in galleries, like the railway on the Blue Mountains over and above Sydney, New South Wales. Not only is Carrara itself lit—and well lit—by electricity, but so also are the various country roads outside that connect it with outstanding villages. Nor is there any jerry building about the place. What few houses are at present being erected have walls—even internal ones—a good 2 ft. thick. In my own hotel, for instance, my bedroom walls are 2 ft. 6 in. through. Of course, all window sills, jambs and heads, lintels, w. c. seats, etc., are of marble. Have spent a pleasant afternoon at Massa, situated about half a dozen miles away, with a mountain between it and Carrara. In a comparatively new church at Massa are nine superb altars of colored marbles. Noticed the great monolith columns in each instance had the astragal at top, worked as part and parcel of the actual dark polished column. Upon these rest Corinthian capitals of white marble. The effect is not happy, the capitals looking (an optical delusion, probably) smaller in diameter than the column beneath. The walk at eventide back from Massa to Carrara was strikingly lovely—one, indeed, never to be forgotten. Outside Massa no end of marble 'factories' and studios exist, and at most of the little wayside cottages the peasants pound away making marble crosses, etc., whilst multitudes of ox-drawn, rude wagons, loaded with huge blocks, passed me, as well as lighter carts laden by slabs of sawn marble. A pair of oxen, generally supplemented by a donkey pulling in front, was mostly sufficient for the latter.

"Friday, June 21.—Noticed the masons in the statuary shops use drags that get the marble up very fine after the chisel. The tool is a 1 in. clawed chisel, stuck on the bevel in a piece of wood much like a carpenter's 'old woman's tooth.' This they keep on sharpening on the rub stone, and it tears away with a rasping noise like the tools French soft stone masons make when they are working moulds and cornices in situ. Curiously none of the studios here go in for a top light and as a rule have lights on one side of the

shop only. They nearly all open out to the street, with shutter-like doors, the latter standing just higher than the head of a man and quite open for 6 ft. or so above. All the native sculptors are most polite and anxious to show strangers the work they are engaged upon.

"Saturday, June 22.—Went to the Italian Bank (Banca d'Italia) this morning, a place more like a prison than an ordinary bank, according to our ideas. Marble internal walls, with just two iron grated openings through bevelled walls, 2 ft. 6 in. thick, looking like port holes. Behind these stand the cashiers who, after turning over the English sovereigns I wished to change very suspiciously, declined having anything to do with them, intimating they were 'no good!' So I tried Messrs. Walton, Gooddy, Cripps & Co.'s offices, where I was finally recommended to try the Banca de Carrara. At the latter place the most courteous manager changed them instantly into the paper currency of the country. Of actual money, in Italy, the most valuable coin I have yet seen is a silver two lire (worth 1s. 8d.). Had some delightful walks to-day. Noticed the pine trees never grow above a certain and regular height upon the mountain sides. Their timber seems to be almost all used for the skids, etc., already described for moving blocks with, the preparation of which is quite a trade of itself. It is good to sit by some rude roadside posada and, whilst sheltered from the sun beneath an overhanging and clustered vine, to drink a bottle of wine at leisure and watch the constant stream of passers by—quaint and barefooted men; women with fantastic headdresses, carrying heavy loads on the top of them; ox carts, helped by donkeys, but seldom a horse.

"Sunday, June 23.—Met Professor Batti Ariano, who for many years I remember at Mr. James Bingham's monumental studios in the Fulham Road, S. W., and, later in the day, accompanied Sig. Adriatico Froli, an exceedingly clever sculptor, to the R. Academia de Belle Arti, a building formerly the palace of the Dukes of Carrara and now the local school of art. The work in hand by the students (for, although it was Sunday, they all appeared hard at it) is excellent, chiefly the figure and mostly from the antique. The clay they use for modelling comes mainly from beds near Florence, but some from the vicinity of Rome. The latter is the darker of the two, and both are several shades deeper than is our English modelling clay, all of which is procured from the neighborhood of Newton Abbot, in Devon. The successful works of former pupils—those who have gained scholarships for Rome (since A. D. 1820) and which usually take the form of figure panels in high relief—are preserved and arranged around upon the walls, with the names of the fortunate competitors, dates, etc., painted below them. The work done in this school, as I have seen it to-day, is far in advance of what art students in England produce."

There, that is enough from my diary for the present. I may refer again to it upon another occasion.

COMPRESSED AIR.*

IN introducing the subject of compressed air before the members of this Institute, I feel that I am addressing those who are not only interested in the subject, but through the discussion which will follow I hope to gain a good deal of practical information. To me compressed air has been a close study and a pleasant pastime for more than twenty years, and yet every time I attempt to climb up on a pedestal and pose as an expert, I see all around me things that I did not know. Though one of the oldest of the sciences, there is really less known about compressed air than about steam, hydraulics or electricity, and however deeply we may dig into the theories of thermodynamics, we find every now and then a practical mining engineer who shows us by a little experience that the formula which has been guiding us is nothing but a cobweb without substance or strength.

I remember very well my first researches on the subject of compression. After learning what was meant by isothermal compression, it appeared very plain that a serious loss was suffered to take place in the cylinder of an air compressor by attempting to compress without injecting a spray of cold water into the cylinder during the process. All theories and most authorities taught me to advocate the "wet" type of compressor as distinguished from the "dry," and yet it is a fact that at the present time I do not know a single builder who follows the wet process. It must not be inferred, however, that the importance of cooling during compression was overestimated. We have learned to cool by compressing in stages and have abandoned water injection because of its complications of apparatus, the inevitable destruction of wearing parts, and because it is not advisable to bring air and water together while the air is at a high temperature. The reason for this is that the capacity of air to take up moisture is in direct proportion to its temperature, and even with the most efficient system of spray injection it is difficult to start the compressed air on its journey to the mine at a temperature low enough to produce dryness. During the building of the Washington Aqueduct Tunnel a central air compressing plant was located at the foot of a hill. The transmission pipe leading up the hill to the shafts would at times become practically filled with water which would be taken up and sent forward like a piston into the workings. It is interesting here to note that this difficulty was overcome by pumping fresh cold water into the air receivers at the foot of the hill, thus condensing the moisture of compression. Dry stage compression actually gives as a pressure line more nearly the isothermal than was obtained by the injection process. In stage compression there are two or more air cylinders each surrounded by water jackets. Intercoolers are placed between the cylinders, and in this way the air is alternately compressed and cooled until it is discharged into the re-

*Paper read before the Institute of Mining Engineers in Montreal.

ceiver. By this process the air is maintained in a dry condition, and as it at no time reaches a diabatic, or the heat maximum of temperature, it is not "burned," but is delivered into the mine in a fresh and healthy condition. Too little importance is sometimes given by engineers to the intercooler. The common or cheap form of intercooler only partially serves the purpose, but the intercooler which is composed of nests of tubes around which the air circulates, splits up the air into thin layers and as cold water passes through the tube these thin layers are rapidly reduced in temperature; so that with cold water, which I judge is not difficult to obtain in Canada, it is quite possible to obtain air temperatures in the intercoolers considerably lower than was the temperature of the air before it entered the compressor. This is an important point as affecting both the actual and the volumetric efficiencies of the air compressor. The theoretically perfect compressor is one which draws in air at a temperature of zero or lower and discharges it compressed at normal or outside temperatures. We must always bear in mind that during compression the temperature of the air at any stage depends upon its initial temperature, and that the higher the initial temperature is the higher will be the temperature throughout the process of compression. This is not a theoretical but a practical question, which concerns those who are engaged in the every day practice of air compression. Engine rooms are usually warm and dirty places from which to draw a supply of air for the compressor. Hot air means thin air, and thin air drawn into a compressor means a low volumetric efficiency. The mine owner who pays for an air compressor of a certain size naturally wants to get out of it all the compressed air he can. He should therefore see that the compressor draws air from outside the engine room and from the coldest spot on the property. He should also see that his compressor is provided with a thorough system of cooling, because no matter how cold the air may be, when it goes into the compressor it is sure to warm up by the action of the piston. This warming up process causes the air to expand and to resist the act of compression in degree directly in proportion to the increased temperature—that is, the hotter it is, the harder it is to compress the air and the more power is consumed for a given volume. To express this in figures, we find that when air is compressed in a single stage machine from atmospheric pressure and 60° Fahrenheit temperature to 80 pounds gauge pressure, the maximum theoretical loss due to increased resistance through heat is about 33 per cent., when represented in foot pounds of work. As a matter of fact no such loss is ever suffered, because maximum temperatures are never reached even in single stage compressors, cool metallic parts brought in contact with the air absorb some of this heat, so that we may safely say that a well designed water-jacketed single-stage compressor suffers a loss of 20 per cent. in foot pounds of work when compared with isothermal or perfect compression, and under the conditions of temperature and pressure stated above. We may therefore say that in compressing air to 80 pounds pressure without compounding, it is possible to lose one-third in power though we usually lose one-fifth. To illustrate with these figures the importance of compounding, I would state that under the conditions stated a two-stage com-

pound compressor, when properly designed, would suffer a loss of a fraction over 15 per cent., and in a four-stage machine we are able to get this down to near 5 per cent. As some of you may be using air at 100 pounds pressure, you may be interested to know the figures under these conditions. The maximum loss in a one-stage compressor is 38 per cent.: this in a two-stage machine may be brought down to a fraction over 17 per cent., and in four-stages to 8 per cent. Even at 1,000 pounds pressure the heat loss in a four-stage compressor is brought down to 17 per cent. All representing foot-pound of work.

The subject of cooling is not complete without a brief statement about after-cooling. It is easier to get our ideas about intercooling carried out than it is to get any hearing when we talk about after-cooling. Assuming that you agree with me that air should be cooled before it enters a compressor and that this process of cooling should go on *during* compression, I would also like you to agree that even after we have bottled up the air in the receiver something might be gained by inflicting it with a further and final cold bath. This is really the last time that the cooling process should be applied, and from this time on we are to turn square about, reverse our treatment, and begin to warm up. An after-cooler between the compressor and the reciever, or just outside the receiver in the main line, is a good thing because it will serve as a condenser to abstract moisture from the air by bringing its temperature below the dew point. Air at all times contains moisture, the average moisture being about 50 per cent. of what is required to produce saturation, and it is safe to say that during our cooling process in the compressor we are not likely to abstract any of this moisture. The only mechanical way as distinguished from the chemical process by which we may get moisture out of air is to lower its temperature. But we must lower it below its initial temperature to produce any results. Notwithstanding the best systems of jacketing, compounding and intercooling, the compressed air is usually discharged into the receiver at a temperature about double the initial temperature, and as this air cools on its journey to the mine, it is likely to condense moisture on the interior walls of the pipe. In cold weather this freezes and accumulates, sometimes restricting and even stopping the passage of the air. In other cases it condenses its moisture in the ports and passages of the drills and pumps. These troubles can be reduced to a minimum and even overcome entirely by a thorough system of after-cooling, which means nothing more than reducing temperature and abstracting moisture just outside of the engine room.

Before leaving the subject of compression, I would say a word about oil. Air cylinders do not require oil either in quality or quantity like steam cylinders. What is good for the one is bad for the other. A steam cylinder needs an oil of low flashing point, and plenty of it, because the tendency of the wet steam is to wash the oil out of the cylinder. Not so with air, there is no washing tendency and very little oil will last for a long time. This oil should be of the best quality obtainable and of a high flashing point. It should not be a coking oil, that is when evaporated on a piece of hot metal it should not leave a carbon deposit. This is a subject which has been very

much neglected, and this neglect is responsible for much waste of money, and worse than this, for explosions which destroy property and threaten lives. The actual amount of oil that should be used in an air cylinder is one-quarter that which should be used in a steam cylinder of the same size. I would call this a maximum, for very much less will often suffice, especially where the oil is of the best quality. Too much oil where there is a coking tendency results in choking the valves and ports. A discharge valve might stick through coking, and when stuck it will admit some of the hot compressed air into the cylinder against the receding piston, which on the return stroke is compressed and carried to a temperature beyond the flashing point. Sometimes when discharge valves give trouble, they are cleaned by injecting kerosene; this is a fatal error. Kerosene should never be used in the air cylinder, but instead of this, fill the oil-cup with soap-suds made preferably of soft soap, and feed this into the cylinder; let the compressor work with soap-suds instead of oil for a day each week and no harm is done, care being taken to feed with oil a half hour before stopping, so that the parts may not be subject to rust, which is the only danger from soap-suds.

Compressed air has always been and still is supreme in mining. As a means of transmission and for surface work it must in many cases give place to electricity and hydraulics, but as an underground power its supremacy is admitted. No power is so safe, none so free from objections in mining work. It aids ventilation and cools the heading. If the conduit pipe is large enough, you will suffer no loss by friction and may convey compressed air several miles from the generating station. In recent years compressed air economies in production, transmission and use have opened up a large field in directions other than mining. All of our large railway systems are now provided with pneumatic appliances in the shops and many of them use the system for switching. Machine work of all kinds, such as drilling, chipping, riveting, moulding and hoisting is done by compressed air. The air lift pump, for lifting water, salt water and oil from wells occupies a field of much usefulness. The compressed air locomotive has an established place in and about mines, nine of them being in constant operation in the Anaconda Copper Mines in Montana, and several are now at work for the Cambria Steel Company in Pennsylvania. The use of compressed air in bridge and tunnel work has made possible many of these large undertakings. The Blackwell tunnel under the Thames, in England, is one of the most recent evidences of the utility of compressed air for such work. The stupendous scheme, which has been inaugurated by the Pennsylvania Railroad, to bring its terminal into the heart of New York City, is made possible only by the use of compressed air.

In conclusion, it may be interesting to call your attention to a column of "Donts," which I found in an engineering paper published in far off New Zealand, and from which we may all, I think, carry home some useful lessons.

"Don't install a compressor just about equal in capacity to your present requirements, for when once you have compressed air available its number of uses becomes legion. Good practice is to provide a compressor at least

50 per cent. greater in capacity than your immediate necessities demand. Duplex compressors are made divisible, permitting the installation and operation of one-half at first and the other half later when the additional capacity is needed.

"Don't accept the theoretical capacity of an air compressor stated in the list of the maker, as the equivalent of the actual volume of air needed for your service. Remembering the difference between theory and practice, allow a small deduction for friction, heat, clearance, etc., being unavoidable losses in air compression, before calculating what your actual delivery in compressed air will be.

"Don't buy an air compressor because it is cheap. It will prove the most expensive proposition of its size that you have ever encountered. If a water pump fails in its work, you will know it at once; if a steam engine is deficient, its shortcomings are self-evident, but if an air compressor is poorly designed or badly constructed, it may continue in the evil of its ways until the scrap-heap claims it for its own, unless as is more than likely, an absolute breakdown calls attention to its deficiencies, and you learn all too late that the hole it has made in your coal pile, added to the loss of keeping it in repair, would have paid a handsome interest on the additional first cost of a properly designed and properly constructed compressor.

Don't buy a second-hand compressor unless you know it has given satisfaction in work similar to your own, and that its working parts retain their full measure of usefulness without deterioration. An air compressor with valves, pistons, etc., worn out or in bad repair, can waste more good power than anything of its size known.

Don't buy a compressor that your neighbor used for operating oil burners because you intend putting in pneumatic tools. For, even if all compressors look alike to you, experience teaches that oil burners operate under 12 pounds pressure, whilst pneumatic tools require 100 pounds, and the oil burner compressor, with unevenly proportioned cylinders, devoid of water jackets, will equal your service as well as a low pressure boiler for heating will run a high speed engine.

Don't use air brake pumps or direct acting compressors. Statistics show that their steam consumption is about five times that of a crank and fly wheel compressor for the same volume and pressure of air delivered.

Don't install a steam driven compressor if your steam supply is short and plenty of belt power available.

Don't put in a belt driven compressor if you have plenty of steam and are short of belt power.

Don't draw your intake air to the compressor from a hot engine-room, or from any point where dust is abundant. The volume of air delivered by the compressor increases proportionately as the temperature of the intake air is lowered, and dust or grit entering the compressor clogs the valves, cuts the cylinders and generally impairs the efficiency.

Don't use any old thing for an air receiver. Compressed air under 100 pounds pressure will leak a horse-power through a 1-16 in. diameter hole in five minutes, and a well made, strong, and tight air receiver is the second

essentially important factor if you would realize to the utmost all the advantages which compressed air provides.

Don't connect your air admission and discharge pipes improperly at the receiver. To secure the best results and eliminate moisture from the compressed air, connect your pipe leading from the compressor at the top of the receiver and lead your air pipe to points of consumption from the bottom of the receiver.

Don't have leaky air pipes. Test your piping when it is installed, and at regular intervals thereafter, allowing the full pressure to remain an adequate length of time, and if the gauge indicates leakage locate and remedy it.

Don't install your piping without properly providing for drainage of condensed moisture at regular intervals in the system. The simplest method is to slightly incline the branches leading from the main line and insert drain cocks before the hose connection is reached.

W. L. SAUNDERS.

THE STONE OUTPUT FOR 1901.

SEVERAL months ago this magazine gave an extended review of the stone production of the country for 1900, based upon the latest available figures issued by the Department of Mineral Resources of the United States Geological Survey. In the course of these articles it was stated that the year under consideration was just beginning to feel the general conditions of prosperity that were then in full force in almost all other branches of industry. While there was an advance in almost every branch of stone production, the total increase in value of the stone output over the previous year amounted to only $4,000,000. It was confidently stated that the output for 1901 would show a far more decided advance than this, and that the total value of stone produced would reach the biggest figures in the history of the country. How thoroughly this prediction was justified is shown by the figures for last year, compiled by the Department of Mineral Resources. This volume is now in press, but we are in receipt of advance sheets. These show that the entire production of stone in the United States in 1901 was $60,982,060, a gain of $12,295,405 over the value of the production in 1900. This is by far the largest output the country has known, and is almost double the stone production recorded for any year in the period between 1893 and 1898. The total value just given includes also, in order to show the entire stone production for the whole country, the value of grindstones and whetstones and for limestone for blast furnace flux.

Limestone, including blast furnace flux, showed the greatest increase, from $20,354,019 in 1900 to $26,406,897 in 1901, or 30 per cent. Granite showed the next greatest increase, from over $12,000,000 in 1901 to over $15,000,000 in 1901, or over 26 per cent. Sandstone increased from over $7,000,000 in 1900 to not far from $9,000,000 in 1901, about 24 per cent. The marble production increased to $4,965,099 in 1901, or 16 per cent., and the slate production increased to $4,787,525 in 1901, about

13 per cent. These figures are all suggestive. It is natural that limestone production should show the greatest increase because almost every branch of activity, especially building and public work, makes an increased demand upon the iron foundries. In addition to this, when the fullest figures are available, it will be found that there is a striking increase in the production of limestone for structural purposes. But the figures for granite production are the ones that give the most flattering idea of the prosperity of the stone trade. All of this stone is used for legitimate building and construction work, even though it be in the form of crushed stone for concrete. We are confident that a large part of the increase will be found to consist in the stone furnished directly for building purposes, either dressed or in the rough. We have taken occasion more than once recently to comment upon the greatly increased use of granite for business buildings in the large cities, where it is in great measure supplanting brick and terra cotta. The monumental trade will also show an increase, as this branch is keenly sensitive to general business conditions. The sandstone increase must also be credited very largely to building activity. The fashions in building materials change like those in dress and for some years sandstone was not given a fair consideration by the architects. This was only an offset for the taste of a generation or two ago, that might almost have been known as the sandstone age in building. This was followed by a neglect of sandstone wholly unjustifiable considering the excellence of the material. No stone permits of greater range and richness in color and it is fitting and proper that it should be restored to high favor again.

The marble increase is not as great as might have been expected at first thought, but this is easily accounted for. The call for marble for interior finish must follow after a considerable interval of time the demand for stone for exterior purposes. For years, too, Italian marble has been unduly favored by architects. The strikes and labor troubles at the Italian quarries resulted in great shortage of stock in the American market and builders and contractors were forced to turn to the American quarrymen for supplies. This led to the development of a number of quarries producing light marbles suitable for interior decoration. It has served to give these a fair start and now there are a number of companies producing marbles in this country as rich and beautiful as any that come across the ocean. It is certain that another year or two will see an immense increase in the production of American decorative marbles. Within the past two or three years there has been a great gain in favor of marble for structural purposes. Some of the most notable buildings recently erected in the large cities are of this material and a number of quarries producing the highest grade building marble have been opened, notably in Vermont, Massachusetts, New York and Georgia.

That slate stands at the foot of the list in the matter of increase will surprise no one. There is a general lack of enterprise in the slate industry of this country and this fact must be apparent to everyone who has studied the situation. When the exportation of slate to Great Britain was first at-

tempted, much of the stock was of a class that could not find a ready sale in this country. It was not first-class nor was it thoroughly representative of our quarries. It met with very little favor on the other side and has very greatly hampered all subsequent exportation of American slates. Under the best of circumstances there are certain American slates that cannot expect to get a foothold in Great Britain. There is a certain peculiarity of the climate that causes them to disintegrate and so the British architects and builders will only use those varieties that have been thoroughly tested on the other side. Certain English merchants, undeterred by the reputation given to the first American slates in Great Britain, sought to introduce another variety that they were convinced would withstand the climate. But here they were met by prices that made business absolutely impossible. If the producers of the best varieties of American slates had been willing to make some concession in price in order to capture a great market, they could have obtained a strong foothold in England during the labor troubles that have prevailed in the slate quarries there for the past two years. They have not been alive to their opportunities, however, and there is more than a possibility that the producers of Newfoundland slate will get ahead of us in England. The figures for the year 1900 show that roofing slate to the value of $950,543 was exported, and only $898,262 in 1901, a decrease for the latter year of $52,281.

Among the individual States Pennsylvania, producing every kind of stone, is still far in the lead of all others, its output being nearly double that of its closest rival. The total production of Pennsylvania was $10,772,288, a gain of more than $2,000,000 over the previous year. Vermont still has second place, with a product valued at $5,366,740, a gain of almost $1,000,000. Ohio has now passed New York, the value of its output for the past year being $5,183,225, as against $3,653,367. Then follow in turn New York, Maine, Indiana, Massachusetts and Illinois, in the order named, each one of these States producing stone valued at over $2,000,000.

The increase in the building stone produced in 1901, as compared with 1900, is notable. In 1900 it was valued at $10,672,598; in 1901, at $15,112,600, a gain of $4,440,002. Crushed stone for road making and for various other purposes increased in value from about $6,500,000 in 1900 to $8,500,000 in 1901, a gain of over $2,000,000.

The value of stone imported into this country for the fiscal year ending June 3, 1901, was $1,276,602, as compared with $1,028,550 for 1900, a considerable increase, of which marble and manufactured marble constituted by far the greatest part, amounting to about $1,024,687. The total value of the stone exported from the United States in 1901 was $1,672,876, a decrease of about $90,000, as compared with 1900. The increase in the importation of stone means very little to the American quarrymen. It is confined almost exclusively to decorative marbles and of these we shall always take the choicest products of the foreign quarries. The importation of structural stone has almost wholly ceased. During the past year or two much has been written in the English technical press concerning the beauty of American marbles. It will be remembered that in the article by Fred-

eric Harrison, which we reprinted in these columns, one of the things that this great critic recorded was his astonishment at the great beauty of American marble, and the profuse use that was made of it here. He wondered why these marbles had not been introduced into his own country. American granites are invading Great Britain, and before another year has passed we are convinced that some of our marble producers will exploit this field. One company which began operations but a short time ago, but which is already putting on the market some of the most beautiful and distinctive marbles that have been quarried in this country, is making inquiries in this field. It has already met with decided encouragement.

THE GREATEST CEMENT PLANT IN THE WORLD.

THE Edison Portland Cement Company's new plant near Stewartsville, N. J., has begun operation. This is the largest cement plant in the world and a force of 600 men has been occupied over two years in building it. The plant covers a space half a mile long and a quarter of a mile in width, there being a total of 27 buildings. Much of the machinery is of special design for this plant. The total cost of the construction to date is said to have exceeded a million and a half dollars.

Some years ago Thomas A. Edison conceived the idea of improving the existing methods of cement making. Near Stewartsville an inexhaustible deposit of cement rock was found and after careful experiments it was found that this would make a high grade of cement. The company was then organized and Mr. Edison began to devise special machinery. Every bit of it was tested before it was installed and a working model of considerable size was constructed at a cost of many thousands of dollars. The peculiarity of the machinery is that the material is handled almost exclusively by the aid of electrical power, manual labor being very largely eliminated. The machinery is built for a capacity of more than 10,000 barrels a day, but the buildings were made to accommodate half the amount at the start. If the business proves successful, the plant will be increased to its fullest capacity in the course of a few years. About 300 men are given employment at the outset.

There is no need to attempt a technical description of the plant in a magazine of this sort, the results that are achieved being the main consideration, rather than the methods by which they are arrived at. The various engineering publications have already described the special features of the plant with greater or less fullness. All of the buildings are connected by a deep tunnel half a mile long, fifteen feet wide and twenty-five feet deep. The walls are the solid rock through which it was cut and it is paved with concrete. In the stock house are two 600 feet corridors one above the other and connected by big flues. There the cement rock is roasted and prepared for the refining process. The raw material will be conveyed from this building through the tunnel by means of an electrical railway, to the crusher, thence to the dryer. The crusher is located in a building four stories high, the two sides being of solid masonry ten feet thick at the bottom and five feet at the top. The floors are of steel construction. The machinery is cap-

able of crushing 25,000 barrels of cement rock every twenty-four hours. The crushers have a pressure of one hundred thousand pounds to the square inch, but by means of one of Mr. Edison's inventions this immense pressure is obtained on the steel rollers with less than one thousand pounds pressure on the bearings. The dryer is a simple stone shaft twenty feet square and thirty feet high with a series of drying pans inside. The refining process is a secret invented by Mr. Edison, who is confident that it will do much towards revolutionizing the cement industry. In being transported to the various buildings the cement material passes only through a tunnel and in each case is handled automatically. The finished product will be delivered into barrels in a building through which several railroad tracks pass, so that the barrels can be loaded as fast as they are filled.

All of the buildings re of steel construction covered with corrugated iron and painted black. One hundred and twenty-five motors are used in the plant. The water supply is furnished by Pohatcong Creek. A large reservoir has been built for storage purposes and the water is delivered into this by powerful pumps in a pump house located on the banks of the creek.

The important part that Warren County, N. J., is likely to take in the cement industry of the country is shown by the fact that there are now two plants near Phillipsburg that are turning out 5,000 barrels a day, and one near Belvidere with a capacity of 2,000 barrels. If the Edison Company begins with a production of half the output called for by the original plans this will give a total production for this limited territory of 12,000 barrels of cement a day at the present time. In addition to this a new plant is in course of erection at Marksboro, which will add another 1,000 barrels daily, and plans have been perfected for still another 2,000 barrel plant. If the Edison Company carries out the announced intention of increasing its plant to its fullest capacity, and if the two new plants are brought into working order, it will be seen that this one little corner of New Jersey, taking in only a few hundred square miles, will have a total production of 20,000 barrels of cement, or a grand total of more than 7,000,000 barrels a year. This is nearly two-thirds of the total consumption of Portland cement for the entire country last year. The production of the State of Michigan is likely to be even greater and Indiana promises to be a good third. When one takes into account the enormous output of New York, Pennsylvania, Missouri, Alabama, Colorado, California and Texas, to say nothing of the States that have a fair output already, but have made no special progress during the past year or two, one can but wonder what the end will be.

THE FALL OF ST. MARK'S CAMPANILE.

THERE are few architectural disasters that have attracted such world wide attention as the collapse of St. Mark's Campanile in Venice. The newspapers in all parts of the civilzed world have given particulars of the fall of this structure. Although it is now known that the disaster was foreseen and that ample warning had been given, to the world at large the news came as an absolute surprise. The vast tower seemed to melt away and now lies in a heap of ruins in the Piazza. The gen-

eral interest that has been awakened and the universal regret for the catastrophe is readily understood. It was not because of any architectural beauty of the structure, for the Campanile in itself had never won the praise of critics. It was because of the history that clustered around it and made it an epitome of the story of Venice, and because it dominated, by reason of its size and location, one of the most remarkable bits of landscape in the world. Aside from all æsthetic and historic considerations, the disaster has a particular interest for builders and stone men everywhere.

Before discussing the destruction of the Campanile it is essential to consider its history, construction and appearance. "Campanile" in Italian has precisely the same significance as bell-tower in English and has largely supplanted the compound word for structures that have been erected in this country. Italy is one of the few countries where the bell towers of churches are ever detached from the main structure and form no integral part of the design. St. Mark's Campanile, which stood at the junction of the Piazza and the Piazzetta between St. Mark's Cathedral and the Ducal Palace, was 323 feet high and 42 feet wide at the base. The top was reached by a winding series of inclined planes, the gradients of which were so easy that thousands of visitors, who would never have climbed steps, were every year tempted to make the ascent to enjoy the magnificent view, which included the whole of Venice, throned on her hundred isles. The tower was of brown brick resting on a stone base and decorated with slight pilasters. The early history of the Campanile is obscure. According to some it was begun as early as 888, but others give the date as 902. It was restored in 1329 and the marble top added in 1417. The huge bronze angel which decorated the extreme pinnacle was reared in 1517. It was not until the twelfth century that the tower was raised as high as the belfry. Buono, architect and sculptor, is credited with the reconstruction of the belfry and the addition of the pyramidal top about the year 1510. The appearance of the tower is familiar to almost every one, for the Piazza, with St. Mark's Cathedral and the Campanile, has always been a favorite subject with artists and photographers. John Ruskin said of the tower:

"It is built as simply as it well can be to answer its purpose. It has no buttresses, no external features whatever; one bold square mass of brickwork; double walls, with an ascending inclined plane between them, with apertures as small as possible, and these only in necessary places, giving just the light required for ascending the stair or slope, not a ray more; and the weight of the whole relieved only by the double pilasters on the sides, sustaining small arches at the top of the mass, each decorated with the scallop or cockle shell. Then, when the necessary height is reached, the belfry is left open and the whole crowned by as much spire as the tower would carry to render it more servicable as a landmark."

Ferguson, in his "History of Architecture," is even less flattering to the structure. He says:

"One of the oldest and certainly the most celebrated of the Gothic towers of Italy is that of St. Mark's at Venice, commenced in the year 902; it took the infant republic three centuries to raise it 180 ft. to the point at

which the square basement terminates. On this there must originally have been an open loggia of some sort, no doubt with a conical roof. The present superstructure was added in the sixteenth century; but though the loggia is a very pleasing feature, it is overpowered by the solid mass that it surmounts and by the extremely ugly square extinguisher that crowns the whole. Its locality and its associations have earned for it a great deal of undue laudation, but in point of design no campanile in Italy deserves it less. The base is a mere unornamented mass of brickwork, slightly fluted, and pierced unsystematically with small windows to light the inclined plane within. There are no doubt important elements in that low class of architectural excellence of which the Egyptian pyramids are the type; but even in these elements this edifice must confess itself a pigmy, and inferior to even a second-class pyramid on the banks of the Nile, while it has none of the beauty of design and detail displayed by the Giralda of Seville, or even by other Italian towers in its own neighborhood. The Campanile at Picenza is, perhaps, more like the original of St. Mark's than any other, and certainly displays as little beauty as any building of this sort can possess."

From these opinions, which represent the views of most enlightened writers, it may well be understood that a proposition to reproduce the tower according to the original design, calls out many protests from architectural students. That some kind of a tower will be put up on the spot is certain, for sentimental considerations demand it, and nothing is stronger than sentiment in such matters. There will be an excellent excuse for modifying the design, as it has been found that no detailed drawings of the tower exist in the whole of Italy, despite the fact that it has long been known to be in an insecure condition.

A score of reasons have been adduced to account for the collapse of the historic pile, each one conclusive until the next has been heard. In the first place, it is well to remember that the structure was of brick. The technical press that is devoted to clay products is constantly dwelling upon the superiority of brick construction, its durability and its fire-proof quality. Even at this lapse of time, as we showed by quotation a month or two ago, the publications that champion brick building are still discussing the danger of stone construction, using as their text the fire in the Home Insurance Company's building in New York. One may be permitted to express the belief that if the Campanile had been of masonry construction it would still be standing the pride of Venice. Among the many causes for the disaster that have been suggested there are a few that are worthy serious attention. First, the foundations are said to have been faulty, but this seems to be disproved by the report of an American architect to which reference will be made hereafter. Poor building of the walls and the use of Istrian lime, which does not set hard, are contributing causes that are plainly shown by an examination of the debris. Prof. Belar, Director of the Seismographic Observatory at Laibach, is chiefly responsible for the suggestion that earthquakes may have been the cause of the collapse. This is ridiculed by other eminent seismographers, and yet it may readily be believed that earthquake shocks and lightning strokes contributed to the downfall of the edifice.

Other suggestions are that the excessive weight of the Renaissance belfry crushed the whole tower; that the cannon fired at nine o'clock every evening on the Island of San Giorgio opposite may have set up vibration that gradually weakened the structure; that the firing of hundreds of muskets in the Piazza only a few weeks ago may have hastened the fall, and that the constant ringing of the bells may have shattered the structure in the course of a year. The most complete information that is yet available is a letter from Venice written the day following the collapse by Mr. A. Robertson, a Scotch engineer. Mr. Robertson says:

Though the walls were thick, for they were only a few inches under 6 feet, they were really not solid. They consisted of two parallel walls of brick, the space (3 feet wide) between them being filled up with broken bricks, rubble, cement, stones, etc. Therefore the walls were not so strong as they looked.

The cement used was Istrian lime mixed with sea sand. This lime does not become hard, nor does it adhere well to the bricks. Indeed, in the course of the past centuries it became dry powder. It is all over Venice to-day. It formed the cloud that hid the falling Campanile.

It had been damaged by lightning, by fire and earthquake several times. On June 7, 1398, it was struck by lightning. In 1401, on the occasion of festivities for the Doge Michael Steno, fires were lighted on the platform, and the top was burned. On October 24, 1403, the same thing happened. In 1405 the same thing happened. In 1417 it was struck by lightning, and the new top of wood again burned. On June 21, 1436, all the shops round the Campanile built against it were burned. On March 26, 1511, an earthquake split its four corners. In June, 1548, it was struck by lightning. In 1565 it was struck by lightning. On July 10, 1591, an earthquake caused it to shake from top to bottom. In 1653 again struck by lightning. On August 23, 1657, again struck by lightning. On April 23, 1745, again struck by lightning, which damaged its east side severely, killing many people in the Campanile and near it. This was its last and most serious damage, although it was not till June 18, 1776, that the Republic employed the scientist Guiseppe Toaldo to put up a lightning conductor.

The Republic, seeing its east side to be severely damaged, consulted two engineers of fame and ability, Signor Zandrini, of Venice, and Signor Polene, of Padua, to examine and repair it. These engineers said the whole wall wanted support, and they proposed building a new wall against the old one. This was done. But the new wall was never properly tied to the old one. The two were practically separate, and so the weight of the Campanile was borne unequally and its equilibrium disturbed.

Twenty years ago one of the corner pilasters of the inner wall, and precisely that at the northeast corner, was seen to be cracked in many places. The authorities of St. Mark's Church, who have charge of the Campanile, as it is the bell tower, had this pilaster tied up. No more cracks appearing anywhere, the Campanile was thought perfectly safe and was let alone.

And now comes the critical point. The Loggietta, little marble hall built by Sansovino, rests against the eastern wall of the Campanile. It had

almost a flat roof. To prevent the rain beating against the Campanile and running down its side from entering this marble hall, a row of slabs of stone sloping downwards was inserted in the Campanile where the roof met it.

Only last week, that is, but ten days ago, these stones were begun to be removed, as the rain was somehow getting into the Loggietta, and a lead sheeting was to have been substituted. Instead of carefully removing one stone at a time, they removed half of them, that is, 25 feet of them. Not only so, but they dug through the new wall of the Campanile, that of 1745, and struck the old original wall, which they found separate from the new, and full of holes and cracks. Whilst working, the old wall slipped down an inch or two. Instantly the cut made was built up, but it was too late. On Wednesday it was observed that the new wall was cracked at the northeast corner, above the Loggietta, where the work was begun. On Thursday it enlarged. On Friday it struck across the north side of the Campanile, sloping upward to the second window from the ground, then up to the third. On Saturday it passed behind the fourth and through the fifth. On Sunday the situation was, to use the word of an engineer, "desperate," and the Campanile was doomed. On Monday the crack visibly opened whilst we watched it, and the end came in a moment, when the whole structure sank into itself.

We have left until the last a consideration of what seems to us the most vital matter, the foundations. The Venetians themselves long had a popular belief that the foundations were as deep as the Campanile was high, spreading like a great pyramid under the Piazza. This fallacy was disproved some years ago by the investigations of Signor Boni, who found sixteen feet below the pavement level a *zatterone* or large timber raft resting on ten-inch piles, these latter being topped with masonry, on which the brick structure stood. This raft was only one foot more all round than the Campanile's base and Signor Boni pointed out that the tower was therefore quite one-third too high. As far back as 1885 a critical examination of the foundations was made by Mr. C. H. Blackall, an American architect. He found that the raft was made of a double row of logs, one row laid crosswise on the other. This timber was not rotted at all. The piling directly under the foundations was surrounding by an exterior fencing of piles at the same level, wholly separate from the foundations and bearing no weight whatever.

Vasari, writing in the sixteenth century, says in his life of Arnolfo di Lapo that the Campanile "has never sunk, even by a hair's breadth," owing to the able construction of its foundations. They were laid in a soil consisting of a stratum of the heavy black clay which underlies Venice to a depth ranging from a few inches to a hundred feet; and the secret of the piling done by the Venetian builders was that they did not carry it through to the sand, but confined it to the clay, which, in this instance, was not only compacted and strengthened by such piling, but was bound round the foundations by an additional external fence. The foundations of the Campanile were laid at the same time as those of the church, and to judge from all accounts they were as well and truly laid as any foundations of piles in a lagoon can be. After the digging had been carried down to the stiff clay the piles of white poplar were driven in over the whole area of the tower, and

over these was constructed a level platform of oak trees. Above these rose five courses of trachyte and other granite or porphytric rock in huge masses, and these again were surmounted by six courses of similar stone in step-like offsets forming a plinth to the tower.

One of the first theories that was given to account for the collapse of the Campanile was that there had been a movement of the sub-soil due to extensive excavations in the Grand Canal and the Giudecca. It was also stated that other buildings in Venice were doomed from the same cause. This theory was scouted by Prof. Eduard Suess, president of the Vienna Academy of Sciences and a geologist of European reputation. Prof. Suess expressed the opinion that no slipping or sinking of the soil was responsible for the collapse of the Campanile, and that the earthquakes, in particular, had nothing to do with it. The most recent earthquakes felt in Venice, such as those at Salonica and in Dalmatia, must have been too weak, when they reached the city, to have affected the tower. The Professor's view is that the building itself had become defective through the lapse of time, and that Venice is doomed is true only in the sense that every work of man is destined to destruction sooner or later.

It would seem as if Prof. Suess was, to be confounded at once, for reports have come that a portion of the side walls in the Church of St. John and St. Paul, the next most important church in St. Venice after St. Mark's, have fallen bodily outward and that the entire nave is in danger of immediate collapse. This is proof positive that a close study of the soil of the islands is needed and that it is not sufficient to consider merely the structural weaknesses in edifices that have already collapsed. There are few subjects about which less is known that the movements of underground water and the shifting of sub-soils. Attention was recently called to the matter by extensive damage to St. Paul's Cathedral in London. We have previously expressed the opinion that a serious problem in this line will be met in New York, owing to the disturbances of underground streams in building the foundations for great skyscrapers. The condition of affairs in the lower part of Manhattan Island is not entirely dissimilar to that to be found in Venice. Tide water is reached only ten or fifteen feet below the surface of the street and bed rock is not found until one has penetrated a considerable depth. There is not much cause for fear as to the new buildings we are putting up here, for those in which the foundations are not carried to bed rock are supported on reinforced concrete. The danger is more apt to be to the other and older buildings from an interference with the natural flow of underground water.

A LONG AERIAL TRAMWAY IN COLORADO.

FEW mechanical devices have proved of greater utility in quarrying operations than the ærial tramway. These have been installed in most of the large quarries and their operations are familiar to everyone, even to the dwellers in large cities because of their employment in all engineering work of any magnitude. One im-

portant system of cableways recently established is in the Rocky Mountains at Deep Gulch, Colo. The line is 4,200 feet long, extending from the works of the American Gold Mining Company in the valley up 2,000 feet to the mouth of the mine. Any other mode of communication is impossible. On this slender support, suspended in midair over the steep valley, through which the mountain system makes its way, passengers and freight are carried daily. The line was built by the A. Leschen & Sons Rope Company of St. Louis, Mo., and this company is now building a similar tramway at Encampment, Wyoming, which will be sixteen miles long, the longest of its kind in the world.

The tramway at Deep Gulch consists of two stationary sustaining cables securely anchored at each end. The loaded bucket runs on a rope 1⅛ inch in diameter, while the empties return on a 1-inch rope. The buckets are propelled by an endless steel wire rope ¾ inch in diameter. This rope passes around one 8-ft. sheave at both the terminals of the line, the one at the mine having a number of grips which clamp the rope and afford the means to control the speed of the tramway when in operation. To this wheel are attached the brake-bands for stopping the tramway or controlling it. The buckets are attached and detached automatically to and from the traction cable by means of patent clips, button-shaped, which are attached permanently to the cable. Each of the buckets has a capacity of 6½ cubic feet and they are so placed in the pendent as to swing freely, thus allowing them to be dumped at the lower station of the line as described later.

The difference in elevation between the two terminals of the tramway is about 2,000 feet, and the weight of the loaded buckets traveling down is sufficient to operate the tramway by gravity and in addition has sufficient force to bring supplies up to the mine. About midway of this tramway is placed what is known as an intermediate station, so designed that later on it can be used for loading ore from another mine located nearby. This intermediate station is situated in a position where snow-falls are very heavy, and for that reason the entire length of the terminal for a considerable distance on each side is covered with a snow shed. At the lower terminal of the line the tramway consists of a single span 2,100 feet in length without any means of support between. Owing to the automatic levers with which this tramway is furnished, very little labor is required in the entire operation, and brakings are reduced to a minimum. As a bucket enters the upper terminal it is automatically detached from the traction rope and its momentum is overcome gradually, when it is placed in the loading position. After it is loaded it receives an acceleration to overcome its inertia, and is then again attached to the line automatically and travels to the lower terminal. At this station the same operation occurs. In addition, however, the bucket is automatically dumped by means of a frame connected with the terminal shaft. As soon as the bucket enters this terminal and before it is discharged it is weighed automatically by a specially designed scale. The ore brought down in this tramway is of two classes; one which is loaded into the buckets in bulk, and the other of a higher class, which is loaded into the carriers in sacks.

Comment on Timely Topics

A GREAT TRUST TO BUILD SKYSCRAPERS.

THE remarkable development of some of the building and construction companies during the past year or two has foreshadowed a vast combination that would enable one company to dominate this entire field. This is in accordance with modern American business methods. Building and construction lend themselves just as readily to this method of administration as any of the other branches of industry that have fallen into the control of trusts. Enormous skyscrapers have passed the experimental stage and have proved paying investments in a vast majority of instances, when they are erected with judgment and administrated with ability. When the cost of a single structure runs well into the millions, however, it is apparent that the owners and the builders must have abundant capital. There are extremely few builders in the entire country with sufficient resources to undertake the erection of even a single one of these million dollar skyscrapers. When scores of them are called for simultaneously in a limited section of a single city of the United States, it is evident that a reorganization and readjustment of building methods is essential. To meet these conditions the George A. Fuller Company was organized a year or two ago with a capital of $15,000,000. There was no question of its success from the start. The company has recently completed or has now in the process of construction a score of the largest and most expensive buildings for business purposes in the country. It is probable that at any time during the past year the company has had contracts aggregating almost the full amount of its capital stock. The company has not limited itself to the erection of buildings for other owners, but has put up some, like the Broad Exchange building, in which it shares the ownership with the owner of the site.

As building activity seems to be on the increase rather than to show signs of diminishing, a still further development of the building industry became necessary. Again it is the George A. Fuller Company, which is in the lead. There has been formed the United States Realty & Construction Company with a capital of $66,000,000, of which $30,000,000 will be preferred stock and $36,000,000 common. With a part of this stock the new corporation will acquire the good will and assets of the George A. Fuller Company, capital $15,000,000; the New York Realty Corporation, capital $3,000,000, and surplus $2,000,000; the Alliance Realty Company, capital $2,000,000, surplus, $1,000,000, together with the real estate and holdings of the Central Realty Bond & Trust Company. An immediate working capital of $11,000,000 is provided by subscription at par to the preferred

stock by interests connected with the United States Steel Corporation, life insurance companies, banks and trust and realty companies. It is not necessary in this connection to give details of the organization. The directorate will include representatives of the United States Steel Corporation, and of the construction and realty companies, as well as men prominently identified with some of the greatest banking and corporate interests of the country. The company will be ready for business by the first of October and it will establish branch offices in Boston, Philadelphia, Baltimore, Washington, Pittsburg and Chicago. The management announces its purpose of dealing in real estate and erecting big office and other buildings in all of the large cities of the United States. The steel for its construction work will be purchased from the United States Steel Corporation, which will probably make it the largest single customer of the latter company.

It is interesting to consider the effect that the organization of this company will have on building operations in general and upon the kindred industries represented by this magazine. It has been shown that this company has what is well within reason to call practically unlimited financial backing. It is in control of men who are among the shrewdest judges of realty in the country. It is not too much to expect, therefore, that in a short time this company will have a practical monopoly of the erection of great skyscrapers for speculative purposes. We have no doubt that this will prove an excellent thing in the long run. It will mean fewer mistakes than at present, when every man who owns a corner lot in a fairly eligible location hopes to see it graced by a skyscraper. For the present time at least, and for some time to come, the new company may be expected to devote the greater part of its energies to the erection of these enormous skyscrapers, leaving the construction of the smaller business buildings, factories, warehouses and structures of this kind to companies of less means and to the individual builders. In many cases there are larger profits in these smaller contracts than in the big ones, which ambitious builders are sometimes attempted to try to their own ruin. There will be plenty of large contracts for those who cannot be content with smaller affairs, in the way of government and public buildings. It is doubtful if the new corporation will do much in this line, as long as it can build on its own realty. With regard to the building part of it, therefore, we are inclined to believe that the field will be cleared and the situation very much improved.

As to the effect upon the market for building material, the condition of affairs is not so clear. There have been rumors for some time past of combination in the stone line to work in conjunction with these industries. It is only natural that there should be talk and speculation on this subject and there may be no justification whatever for any of the reports. There is no reason why the new corporation should not identify itself with any special steel, cement or brick industry, but in the matter of stone the case is far different. Here there are changing fashions to be taken into account and the fact that the building operations of the company are to be scattered all over the United States and consequently it will be most desirable that it should enter into the open market for its stone and not be tied to the product

of any particular quarry. The saving that would be effected if the construction company operated its own quarries would be inconsiderable and the advantages would be few. In the matter of working the stone, the case is very much the same. There would undoubtedly be certain buildings where there would be a distinct gain if the construction company operated its own cutting plant, but on most jobs we are convinced that better results would be obtained by bids from independent contractors. Owing to the intense competition all of the cut stone work is done at a minimum of profit. Where big yards are working on many jobs in different kinds of stone at the same time, small economies are often possible that could not be had in a yard operated for a single line of work. If the new corporation is wisely counseled, therefore, we believe that it will continue in the future as it has in the past to go into the open market for the purchase and working of its stone.

AN AUTHORITATIVE PRESENTMENT OF COMPRESSED AIR.

THERE are few subjects in which stone men are more vitally interested than compressed air. This is one of the forms of power that seems to be particularly fitted for stone working, not only in getting the stone out of the earth by means of rock drills, but also in dressing and cutting it, through the medium of pneumatic tools, for building and monumental purposes. A few of the more progressive companies have installed complete air compressing plants, in which all of the work is done by this economical and convenient power. Other quarrymen, who have not got as far as this yet, are studying the subject and will doubtless soon avail themselves of the most improved methods. From time to time we receive inquiries on the subject, showing that the trade at large is inclined more and more towards the substitution of compressed air for many of the tasks now left to steam. For the benefit of those stone men who are not content to follow methods merely because they were good enough for their fathers, but who desire to keep abreast with modern development, we take pleasure in reprinting in another column an admirable paper on compressed air. This was written by one of the foremost authorities on the subject in America, Mr. W. L. Saunders. It was an address delivered several months ago before a learned meeting in Canada, where it attracted wide attention.

Mr. Saunders' words will have greater weight with stone men than those of any engineer, no matter how prominent he might be in his profession. For many years Mr. Saunders has made a close study of quarrying operations, because of his business connection with one of the foremost companies manufacturing quarrying machinery and appliances. As an occasional and valued contributor to STONE, Mr. Saunders has done much to place quarrying operations on a more scientific basis than ruled during a former generation. His present paper, therefore, makes a double appeal to stone men, not only because he speaks authoritatively on compressed air, but also because no one is more familiar with improved methods for taking stone from its natural bed.

The French Creek quarry, D. J. Knauer, proprietor, which is near Reading, has been unusually busy this spring, not only in getting out building stone, but also in producing large quantities of paving blocks, which are being used in Philadelphia, Reading and other cities.

Donald Murchison and Michael O'Rourke have formed a partnership for the purpose of working the Devil's Hole stone quarry, near Niagara Falls, N. Y.

The Milwaukee County Board is considering the advisability of purchasing a stone quarry in which to work the prisoners in the house of correction. Union labor in the city favors the scheme.

The Swatara Stone & Lime Company, of Swatara, Pa., have been crowded with orders and are now employing about forty men in their quarries.

Owing to their inability to get all of the help they desire, the officials of the Medina Quarry Company have been compelled against their will to put a number of Italians in their quarries.

Ryan & Conway, proprietors of the West Hill quarries, near Norwich, N. Y., are filling an order for two miles of flagging and the same amount of curbing for New York City.

The Carthage Building Stone Company, of Carthage, Mo., has been incorporated, with capital stock of $35,000. The directors are A. H. Caffee, A. G. Newell, J. P. Newell, Geo. Allen and Thomas Alexander. A number of the stockholders are residents of Pennsylvania. The quarry is located on the Newell-Caffee land and is the nearest one to Carthage, being only one mile from the Town Hall. A switch has already been constructed and a mill will at once be erected. The Carthage limestone has been received with great favor as a building material in the middle West.

Drake, Bartow & Company, of Cleveland, have made an offer for the furnace and limestone property of the Roanoke Furnace Company of Roanoke, Va. The property is now in the hands of a referee in bankruptcy.

James H. Holman, of Hopkinsville, Ky., has leased stone lands near Columbia, Tenn., from N. B. Shepard. Mr. Holman will establish a crushing plant, and has already in hand contracts for thirty carloads of stone a day for railroads and furnace for ballast and fluxing.

The Bedford-Bowling Green Stone Company, of Bowling Green, Ky., has been reorganized. C. H. Bernard, secretary, and J. E. Pitts, of Bedford, Ind., have sold their interests in the quarry to Lee Bloom, of Louisville, Ky. D. Y. Johnson retains his interest and position as general manager. Mr. Johnson is at present Mayor of Bedford, Ind., but upon the expiration of his term will move to Bowling Green.

Gilbert Brady, one of the most prominent figures in the sandstone industry of New York State, died at his home in Rochester at the age of 68 years. Mr. Brady acquired vast interests in stone yards at Rochester and Buffalo, and he owned valuable quarry properties at Albion. These he held until April of the present year, when they were taken over by the Medina sandstone combination.

Immense quantities of limestone are being shipped daily from the quarries in the vicinity of Annesville, Pa., to the furnaces and cement works.

John J. Ryan, of Medina, N. Y., who recently bought the Frank Phipps farm in the town of Albion, N. Y., has commenced stripping the land preparatory to opening a sandstone quarry.

Thomas Ellis has opened a bluestone quarry on the Allentown road at the Narrows, near Meshoppen, Pa. Mr. Ellis is getting out flagstones.

D. H. Whitman, who is operating quarries at South Birdsboro, Pa., is filling a number of large contracts for bridge stone and heavy masonry.

The New England Brownstone Quarry Company at Cromwell, Conn., has recently received several large orders for stone from contractors in New York and Philadelphia.

A prospector in the Upper Uvas, near San Jose, Cal., reports that he has discovered an abundance of pure white and also blue lime rock which would be admirably suited for fluxing purposes. There is also a fine deposit of yellow and white clay. This has been tested and found of good quality for terra cotta and pottery ware. It is located twelve miles from the railroad, however, and could not be used in San Francisco potteries at present, owing to the cheap clays which have all rail transportation from Ione.

The Electric Stone Company, of Belvidere, Ill., has been incorporated to quarry and deal in building and crushed stone. The capital stock is $15,000, and the incorporators are John G. Tripp, Omar H. Wright, Jr., and Sarah B. Wright.

The firm of Conklin & Foss, who operated trap rock quarries at Rockland Lake, with offices at 135 Front street, New York, has been dissolved by mutual consent. The firm was composed of Jacob E. Conklin and Wilson P. Foss.

A new quarry has been opened near Polk, Pa.

Alva and Joshua Smith have opened a quarry on the farm of the latter, one mile east of Emporia, Kan. The stone is found in beds about a foot thick and will be used for foundations. Heretofore all the stone used for this purpose in Emporia has come from quarries six and eight miles southeast of the town.

C. E. Blanchard is opening a quarry on North Main street, Uxbridge, Mass.

Owing to government improvement work along the upper Mississippi, which will be resumed after a year of suspension, preparations are now being made for reopening the government quarry at La Moille. The quarry is on the top of the bluffs, and a large amount of stone has been taken from it for public work.

Daniel M. Norman, superintendent of the Bogart quarry at Dresden, N. Y., is installing a steam equipment. Cobblestones and gravel will be taken from the quarry for paving in Geneva, and also for canal work.

The Malon Quarrying Company has been incorporated under the laws of Delaware to acquire and operate quarries at East New Meadow, Mass. The capital is $50,000, and the incorporators are all from East New Meadow.

The Waveland Stone Company, of Waveland, Ill., has been incorporated with a capital stock of $6,000. The officers are: President, Henry C. Steeg; secretary and treasurer, E. E. Reiman; manager, William J. McHugh. The company has purchased and will operate the Old Shue quarries at Dooley, Ind., formerly owned and worked by Van Fossen & Thorp. The general offices will be at 901 Wabash avenue, Terre Haute. The company will deal in curbing and crushed and building stone.

Martin H. and Edward M. Costello, quarrymen, of Torrington, Conn., have filed a petition in bankruptcy.

Jacob B. Millard has opened a new stone quarry at Millardsville, near Myerstown, Pa.

The old Bennett quarry at Elm Park, near St. George, Staten Island, has been opened after nearly a year of idleness. It is being operated by Moran & Bennett, who are getting out crushed stone.

The quarries at Portage Entry and Jacobsville, N. Y., are very busy and are getting out considerably more stone than last year.

The United States Lithographic Stone Company, of Louisville, Ky., has been incorporated under the laws of Delaware. The company will open a quarry of lithographic stone in Kentucky.

The Beaver Valley red flagstone quarry, near Catawissa, Pa., has been abandoned, owing to the scarcity of good stone.

The Carthage, Mo., Building Stone Company, composed of J. P. Newell, Dr. Coffee, and several Pennsylvania men, has given a contract to Thomas Gatlin to strip the ledge of stone. As soon as the quarry is ready for opening, the work of getting out stone will be taken up.

The stone quarries at River John, Nova Scotia, are being operated on a large scale this season under the management of Spurgeon Gammon. The stone is being shipped to Truro, Sidney and other towns for building purposes.

Messrs. Drennan & Marsh, stone masons of Grafton, W. Va., have opened two quarries at Beaumont, a suburb of that city. They are taking out stone for building purposes and are prepared to do all kinds of cut stone work.

Marble and Granite

The Northern Granite Company, of Neshkoro, Wis., has been incorporated by William J. Carroll, F. B. Phillips and B. W. Sternell. Capital, $20,000. Neshkoro is in Marquette County, between Berlin and Montello.

The new city hall at Colorado Springs is to be built from granite from the quarries of Lynn Atkinson, at Barre, Col. The stone was used in the Kansas State Capitol at Topeka.

The Wisconsin Shiloh Battle Commission will ask the Legislature to authorize the erection of a bronze memorial on the battlefield instead of one made from the native granite, as called for by the statute creating the commission. This is peculiar action for a State having such beautiful granites as Wisconsin.

Kavanaugh Brothers, monumental dealers, of Boston, have opened a branch office at Manchester, N. H.

At the annual meeting of the Brandon Italian Marble Company, J. Duncan Upham, of Claremont, N. H., was re-elected president, and Howard D. Bacon, treasurer. The company was reported as doing a great and growing business, and as being rushed with orders.

Mr. Joseph Shaver, president of the Joseph Shaver Granite and Marble Company, 300 Seventh St., Milwaukee, Wis., recently visited New York. While in this city Mr. Shaver closed a contract for his company for the entire interior marble work in a large and important building in New York. The company has long been established in Milwaukee, and besides the interior marble work it has done in many of the leading structures of the State, it has erected a large number of elaborate and artistic memorials.

The Monarch Stone Company recently opened a quarry on the Dillman farm, south of Bloomington. It is rapidly developing the property, and is now having plans prepared for an incline railway from the quarry to the Monon switch, a distance of about four hundred feet. If this track is built it will be the only one in Monroe County.

The Hellgate Marble Company, of New York City, has been incorporated with a capital of $3,000. Directors: Wm. Greenhalge, Edward J. Snaden, and Margaret Langden, all of New York City.

The plant of the Capital Granite Company, at Graniteville, Vt., was burned, together with the boiler and engines. The loss is estimated at $7,000, with no insurance. The fire was particularly unfortunate, as the company had just received an order for 250,000 paving blocks for Worcester, Mass.

A company has been formed at Topeka with a capital of $30,000, to establish granite works in Granite, Okla. Thomas Molanari is interested.

Worcester, Mass., is reported to be suffering from a shortage of granite blocks.

The Ortonville Granite Company, of Ortonville, Minn., has increased its capital stock from $10,000 to $50,000.

The Northern Consolidated Granite Company has been incorporated with a capital stock of $150,000. The purpose of this organization is to consolidate the granite interests centering at St. Cloud, Minn. The output of the present quarries will be largely increased, and it is expected that new ones will be opened. Chicago parties are back of the enterprise. There has recently been a general awakening of interest in the Minnesota granites and a determined effort is being made to secure their use in all important state work.

The Oregon and California Marble Company, of Ashland, Ore., has been incorporated with a capital stock of $1,000,000. The incorporators are J. C. Whipp, G. W. Vaupel, C. J. Brady and J. J. O'Neill.

The Maine and New Hampshire Granite Company has received a contract to furnish $500,000 worth of red granite for the First National Bank building to be erected in Chicago. The stone is to be cut and dressed at the company's quarries at Redstone, N. H. The company has enough contracts now on hand to keep the quarries running for several years.

The United Granite Construction Company, of New York City, has been incorporated to deal in building materials and to own and operate granite and marble

properties. The capital is $500,000 and the directors are Edwin B. Ellis, of Northfield, Vt., Cyrus J. Hall, of Hall Quarry, Me., and Christopher W. Hall, of New York.

The Flint Granite Company is making extensive additions to its plant at the Rural Cemetery, Albany. A new building, 65 by 100 feet in size, is being erected, and when it is completed the capacity of the plant will be doubled. A traveling derrick and an improved compressed air plant will be installed. The company has begun the manufacture of blocks at its quarry at Chester, Mass., to fill its contract for 250,000 blocks for the city of Albany.

The Morris Marble Works, at Memphis, Tenn., were destroyed by fire recently. Considerable finished stock was lost.

The granite manufacturing firm of Fontana Bros., one of the largest concerns at Williamstown, Vt., has made an assignment to James K. Lynde, of that town. The liabilities are $11,000 with assets of $7,000. Most of the creditors are Barre quarry men. Slow collections are the cause of the failure.

Judge Newman, of the United States Court, has appointed Z. D. Harrison receiver of the Atlanta Marble Works, located near Ball Ground, Ga.

The condition of the granite trade throughout New England is reported to be in a very satisfactory condition.

The Crookston, Minn., Marble Works has been incorporated with a capital stock of $50,000. The incorporators are J. O. Sundt, P. M. Ringdal, F. R. Hamel, John Cromb, and J. J. Sundt, all of Crookston.

The Tennessee Variegated Marble Company has been incorporated with a capital stock of $600,000. The incorporators are E. B. Dillon, Paul De Long, C. M. Henley, W. P. Gamble, all of Columbus, O.

The Columbia Marble Quarrying Company, of Rutland, has been incorporated in Virginia with a capital stock of $200,000. The officers are: J. F. Manning, of Rutland, Vt., president; H. F. Woodard, of Washington, D. C., secretary, and R. C. Birney, of Rutland, treasurer.

The Webb Granite Company has taken on fifty extra men at its quarries at Fitzwilham, N. H., to get out stone for the new City Hall at Newark, N. J.

Frank Phillips has been admitted to the granite firm of Cannon & Slack, at Northfield, Vt., and hereafter the firm will be known as Cannon, Slack & Co.

The Charles H. More Granite Company, of Granite, Okla., has been incorporated with a capital stock of $30,000. The incorporators are: Charles More, of Montpelier, Vt., Joab Mulvane, J. A. Mulvane, and W. F. Evans, of Topeka, Kan.; C. H. Henley, of Lawrence, Kan.; T. J. Molinari, of Granite; Otto A. Shuttee, E. E. and C. O. Blake, of El Reno.

The Booth Brothers & Hurricane Island Granite Company has been awarded a contract for granite blocks for paving about forty blocks in Chestnut and Walnut streets, Philadelphia. The paving is now being gotten out in the company's quarries at Long Cove, Me.

Business at the Benvenue quarries, at Middletown, Conn., is reported to be better than for many months past. Ten new cottages for the workmen are being erected, who number about 150.

The Granite Railway Company, of Quincy, is building a new engine house and is installing new boilers, engines and compressed air machinery.

The Quincy Quarries Company has erected a large crushing plant near the Fore River Ship & Engine Company's works.

J. K. Freedley & Sons are installing new machinery at their marble mill at East Dorset, Vt.

Edward J. Goss, who, until recently, has conducted a granite cutting works at Burlington, Vt., has filed a petition in bankruptcy. His liabilities are $5,449.30, and assets $3,252.72.

The Georgia Marble Finishing Works, Capt. T. M. Brady manager, is building an addition, 105x62 feet in size, for a stockroom.

The granite quarry at Chester, Conn., opened about two years ago by Ezra Dickerson, of Haddam, is assuming unexpected proportions. About two hundred men are now employed, mainly in getting out curbing and paving blocks.

There are now three crews of cutters at work in the sheds of the Hallowell Granite Company. A stone weighing in the rough about fifty tons is being finished for a monument at Pittsburg for H. C. Frick. A new shed, about 400 feet long and 30 feet in width, will be erected in a short time.

At the annual meeting of the Wetmore & Morse Granite Company, of Montpelier, Vt., it was announced that the past year has been the most successful in the history of the company.

Messrs. Ryan & Parker are shipping an immense amount of granite from Stonington, Me., to New York. The company has started its compressed air plant in operation in the quarries at Crotch Island, and now all of the work formerly done by steam is performed by compresed air. About 140 men are carried on the pay rolls.

Limestone and Sandstone

The Miami Stone Company, of Toledo and Detroit, has still further increased its capital stock, from $120,000 to $200,000.

The Bingham Consolidated Mining Company is negotiating for a limestone quarry near Twelve-Mile Pass, in the Rush Valley, Utah.

The Prince William Brownstone Company, of Philadelphia, has been incorporated to quarry brownstone. Capital $50,000.

George Keiss has opened a bluestone yard on Cator avenue, Greenville, N. J.

The Brainerd, Shaler & Hall Company, of Portland, Conn., is filling a large order for bridge stone. There has been a large demand for the cheaper stone at the Connecticut sandstone quarries, and if the higher grades were in larger demand the season would prove unusually successful.

Representatives of the big steel plant at Buffalo have secured options on a ledge of limestone in the neighborhood of Humberton, Ont. If the rock proves suitable for fluxing purposes, a quarry will be opened at once.

A handsome new court house is being erected at Great Falls, Mont. The stone that was specified for the job was a cream-colored sandstone, found in the neighborhood. The stone was in small bodies only in a deposit of shale rock. The fear is now expressed that it will be impossible to obtain enough of this stone to complete the building.

John Henderson has brought suit for $10,000 damages against the Consolidated Stone Company, of Bloomington, Ind. Henderson fell from a derrick to a pile of broken stone and from there into a pond, from which he was rescued with difficulty.

Frank Kearn and W. S. Hooper, of Matoon, Ill., and Dr. W. L. Whitted, Edward F. Hall, R. C. Smith, Samuel Bray, Harry Aiken, A. H. Belden and W. H. East, of Bloomington, Ind., have an option on forty acres of land near that city, owned by David R. Guy. They are having it core-drilled.

The Kettle River Quarries Company, of Minneapolis, has recently received a contract for the interior stone arches for the Church of Our Saviour, Philadelphia. The Kettle River sandstone, it will be remembered, is a light delicate pink of beautiful color and excellent texture. It has a warmth and delicacy that fits it particularly for the interior work of churches, although it is equally suited for exterior work, owing to its great durability. It will harmonize with any finish and is certain to give a very warm, rich effect in interior work.

The Union Portage Entry Stone Company, of Duluth, Minn., has amended its articles of incorporation, allowing it to maintain branch establishments in other parts of the state. The company produces a red and red variegated sandstone.

A vein of yellow metal has been found in the limestone quarry of Robert Riordan, at Annandale, N. J. It is being assayed.

The Lake Erie Limestone Company, of Pittsburg, Pa., has been incorporated with a capital stock of $28,000.

Supervising Architect Taylor, in response to petitions from residents of Joplin, Mo., announces that the specifications for the new $150,000 federal building there will be so drawn as to permit the use of a local limestone, if this is submitted by the lowest bidder and should prove satisfactory.

Mr. Frank Brainerd has been elected president of the Brainerd, Shaler & Hall Quarry Company, to succeed the late John Hall, of Hartford.

A quarry is to be opened on the farm of Henry Perrette, in Lafayette township, Ind., by the Pike Manufacturing Company, of Pike Station, N. H. It contains a sandstone suitable for the manufacture of whetstones.

A large stone and sand industry is to be developed near Sylvania, Lucas county, O. The property has been secured by J. N. Bick, but the company to operate it has not yet been formed. Stone crushers, with a capacity of 200 tons an hour, will be installed, turning out crushed stone for railroad ballast and concrete. The sand will be furnished for glassmaking. A nine-mile branch railroad is one of the improvements contemplated.

The Fort Scott Flagstone Company, of Fort Scott, Kan., has bought what is known

as the Petroleum Flagstone Quarry, formerly owned by C. H. Williams, and located six miles south of Redfield, Kan. The property comprises eighty acres of land and contains several beds of flagging. There are 160,000 feet of stripped rock ready to be taken out.

The Crescent Quarry Company, of Bloomington, Ind., has opened up a new section just west of their present quarry. The prospects for obtaining an excellent stone are excellent. Carter Perring is superintendent.

The American Limestone Company, of Tyrone, Pa., has executed a mortgage for $500,000 on forty-nine tracts of land in Huntingdon, Mifflin, Blair and Center counties. The money will be used for developing limestone quarries.

Some time ago John Oman got an order from the Circuit Court compelling the Louisville & Nashville Railroad to haul his stone from his quarry over the railroad from the Bedford-Bowling Green Stone Company's quarry to Memphis Junction, Ky. The latter company and the railroad appealed from the decision and superseded the judgment. Oman made a motion to discharge the supersedeas, but was overruled. He will therefore be compelled to await the decision of the Court of Appeals.

The lime-rock quarry at Lompoc, near Santa Maria, Cal., is manufacturing more than a hundred tons of lime daily for use in refining sugar in the factories in the neighborhood.

After an idleness of several years, the sandstone quarry at Hampton Station, Pa., will be operated by the Brooke Land Company.

Rich deposits of limestone have been found on the farm of S. O. Miller at Thomasville, near York, Pa., and Mr. Miller will develop quarries.

The Montana Sandstone Company, which operates near Columbus, has increased its capital stock from $3,000 to $100,000. H. G. Pickett has been elected president.

Bedford Stone Wins.

The controversy concerning the kind of a stone to be used in the erection of the new Federal building at Indianapolis awakened a great deal of interest throughout the trade. It is the general custom of the Government to use granite for its public buildings, but the producers of Indiana limestone naturally made the claim that their stone should not be slighted in a great building like this in the very center of the producing district. Indiana limestone has been too widely used and too severely tested to need a defense for its selection for such a job as this. The quarrymen became very much wrought up over the subject, and a delegation was sent to Washington to present the claims of the native stone. We have too high an opinion of the justice and fairness of the government authorities to believe it possible that they would need any very strong arguments of this sort to use the Indiana stone. The final decision in favor of the native material is what we have expected from the beginning. The contract for the building has gone to John Pierce, and the stone will be furnished by the Bedford Quarries Company. That it will be the best quality obtainable goes without saying. Extensive use will be made of marble for interior decoration. The total cost of the building will be $1,250,000, and of this amount about one-half will represent the cost of the stone and the cutting. It is reported that Contractor Pierce will establish a plant in Bedford and cut the stone there, following the same course as that of the Dugan Cut Stone Company in the erection of the Mississippi State House at Jackson. The time allowed in the contract for the completion of this building is twenty-eight months.

Receivers for the Cape Ann Granite Company.

By order of Judge Colt, of the United States Court, M. F. Dickinson and R. F. Herrick have been appointed receivers of the Cape Ann Granite Company, incorporated under the laws of Maine and operating granite quarries at Gloucester and Rockport, Mass.

Several names are signed to the petition —bondholders and creditors of the corporation, but the leader in the movement to regulate the future affairs of the company is the Boston & Gloucester Steamship Company.

According to the papers filed in the case the receivership is asked for by creditors and bondholders on the ground that the company is insolvent, "has defaulted in paying the interest on its bonds," and that attachments have been made in several suits, and "that a receivership would be for the best interest of all concerned to prevent any waste or undue loss in the failure of the business." The receivers will continue the business for the present. Friends of the company say that the receivership of the company will merely be a temporary arrangement.

Stone Trade Notes

M. M. Millard, of Harpers Ferry, W. Va., has leased the large stone crushing plant of Baker Brothers at Dickersons, Md.

The Marion, Ohio, Lime and Stone Company has been incorporated with a capital stock of $20,000. The incorporators are the chief stockholders of the Norris & Christian Stone and Lime Company. The ultimate purpose is to engage in the manufacture of prepared lime product after processes now in vogue in Germany.

The stone yard of Lex & Quinn, at Thirtieth and Thompson streets, Philadelphia, was destroyed by fire recently.

Farmers along the line of the road that is being built from Wales to East Aurora, N. Y., threatened to make complaint to the State authorities. Under the State law the road should be built of limestone with trap rock binding. The road is to cost between $37,000 and $38,000, which will be sufficient to pay for this material. The farmers claim that instead of trap rock and limestone, the contractor is using only field stone, and that their complaints to the supervisors in charge have brought no relief.

The Grafton Quarry Company is erecting a large stone crushing plant at Grafton, Ill., in order to get out stone for railroad ballast.

The National Manufacturing Company, of Asheville, N. C., will be incorporated to manufacture articles from talc. J. H. Shipply, manager.

The Waveland Stone Company, of Terre Haute, Ia., has been incorporated with a capital stock of $6,000. The directors are: Henry C. Steeg, Ewald E. Reiman and William T. McHugh.

The town of Westerly, R. I., will erect a stone-crushing plant at the Rhode Island Granite Works. Stone will be crushed for highway improvement.

The Stone Mining and Manufacturing Company, of Pittsburg, Pa., has been incorporated with a capital stock of $30,000.

B. W. Hough has been appointed receiver of the Scioto Lime and Stone Company, Delaware, O.

On August 1 the Central Vermont and the Montpelier and Wells railroads put in force new joint rules affecting the granite manufacturers at Barre and Montpelier. Under this joint arrangement the railroads, which have for a number of years transported rough stock from Barre quarries to granite sheds in Montpelier without charge, will charge 15 cents per ton or a minimum of $3 per car. In addition to this, where no charge has previously been made for setting in or taking out cars from sidings, a charge will be made at the rate of 20 cents per ton or a maximum charge of $1 per car.

The Atlas Hydraulic Stone Company, of Oklahoma City, Okla., has been incorporated with $10,000, by John T. Jones, Geo. W. Barrett, Jordan B. Thomas and Alexander D. Jones.

The Board of Public Works of Oneida, N. Y., has bought up most of the stone fences in the vicinity of the city. It is found that the stone of which they are made is better for highway construction than the lime rock that is now used for the purpose. The stone is all to be delivered to the city crusher.

Joseph Bourgeault has established the Duluth Cut Stone Company, at Duluth, Minn. A large plant has been installed on the lake shore at Fourth avenue, east, equipped with three large derricks, a saw mill and a stone cutting shed. Twenty-five men will be given employment at the start. Mr. Bourgeault formerly conducted a similar business at Duluth and had many large stone contracts throughout the Northwest. Mr. Bourgeault supervised the cut stone work on the parliament buildings at Quebec.

Forrester Brothers Stone Company, of Kansas City, Mo., has been incorporated with a capital stock of $5,000 all paid in. The incorporators are C. B., John D., and James M. Forrester.

The Marshalltown, Ia., Stone Company has brought a suit for $20,000 damages against the Louis Drach Construction Company, of Cincinnati, and the American Bonding and Trust Company, of Baltimore. The petition of the stone company alleges that on January 30, 1901, the company entered into a contract with the Chicago Great Western Railroad Company to furnish from its quarries at Rockton 250 cubic yards of crushed stone daily, or a total of 44,000 cubic yards between April 15 and November 1 of each year the contract was in force. On March 14, 1901, it

is alleged, the stone company contracted with the Drach Construction Company to lease the quarries and fulfill the contract. The American Bonding and Trust Company is interested in that it went on the Drach Company's bond. The plaintiff avers that the defendant construction company failed to comply with its contract, a copy of which is made an exhibit in the petition, and as a result thereof the plaintiff has been damaged to the extent of $20,000.

The West Shore Stone Company, of New York City, has been incorporated to quarry stone and construct stone buildings, tunnels or wharves. The capital is $1,000,000, and the directors are Curtis C. Bean, John B. Conkling and Albert Schmid, of New York City. The company has the famous old Holdridge quarry at Catskill. This is a fossil limestone, very strong and dense. A part of the stone deposit is marble and takes a high polish. The color is a brownish-gray, with faint markings of red.

Thirty men are now employed in the feldspar quarry at East Kent, Conn.

Monumental News

The United Daughters of the Confederacy of Mt. Jefferson, Va., will erect a Confederate monument at a cost of more than $3,000. It will take the form of a statue of a Confederate soldier 7½ feet high mounted on a granite base.

The citizens of Brooklyn propose to erect a monument limited in cost to $10,000 to the late Henry W. Maxwell, of that city. Sentiment favors a statue to be erected near the entrance to the Institute of Arts and Sciences.

Over $1,500 has already been subscribed for a monument to Gen. Escobedo, to be erected in Monterey, Mexico.

A large statue of St. Anthony, of Padua, which for many years surmounted the chapel which bears his name on Troy Hill, Allegheny, Pa., was destroyed by a recent storm. It will be replaced by a larger and handsomer statue.

The citizens of Penn Yan, N. Y., are doing active work in raising funds for a soldiers' monument.

The Sherman statue for Washington, the commission for which was awarded half a dozen years ago to the late Carl Rohl Smith, is now being completed in Copenhagen by Stephen Sinding. One of the allegorical groups for the base, representing War, has just been finished.

The design of Edward Berge has been accepted for the monument to the Mexican veterans, to be erected in Baltimore. It will be a portrait likeness of Lieut. Col. William H. Watson. The pedestal will be erected by the Guilford & Waltersville Granite Company, of Maryland granite.

The Jefferson Davis Monument Association has $42,000 in the bank and expects to raise the amount to at least $75,000. The memorial will take the form of an arch of Virginia granite at Twelfth and Broad streets, Richmond.

Nashville, Tenn., is endeavoring to raise a fund for a suitable monument to General Robert E. Lee.

There is trouble at Portsmouth, N. H., over the awarding of the $30,000 contract for an equestrian statue of General Fitzjohn Porter to J. E. Kelly, of New York, by the city council. A number of the leading citizens demand that ten of the foremost American sculptors be asked to submit models.

One of the New York papers has published a series of articles concerning the six finest works of sculpture in this city, the choicest having been made by a jury of nine sculptors. The selections made by the jury were as follows: St. Gauden's "Farragut," Madison square; MacMonnies' "Nathan Hale," City Hall Park; Ward's "Washington," Sub-Treasury Building; Brown's "Washington" (equestrian), Union square; French's "Hunt Memorial," Fifth avenue and Seventieth street; Bissel's "De Peyster," Bowling Green.

The Twenty-eighth Volunteer Infantry will erect a monument to their dead comrades who fell in the battle of Cedar Mountain, in the National Cemetery at Culpeper, Va.

A monument to Friend W. Jenkins, who was killed in the Spanish war, will be erected at Pittsburg. More than $1,000 has already been raised.

The Winnie Davis Memorial Hall Committee has the sum of nearly $9,000 on hand for the memorial at Athens, Ga. The corner stone will be laid as soon as practicable.

The Daughters of the Confederacy, of Baltimore, have nearly $16,000 on hand for a Confederate monument.

Galesburg, Ill., is trying to raise the sum of $18,000 for a soldiers' monument.

After discussing the subject for many years, the citizens of Braddock, Pa., are now about to take active steps for the erection of a monument to mark the battle of Braddock's Field.

A committee has been appointed in Long Island City to raise a fund for the erection of a statue of the late Mayor Gleason in Court House Square.

The loyal Scotchmen of Colorado expect to erect a statue of Robert Burns in Denver.

Elizabeth, N. J., has a sum of money on hand and will raise a further amount for a soldiers' monument.

American Roman Catholics are invited to join in an effort to raise funds for a national memorial church at Aldershot, Eng., in honor of the Catholic soldiers who lost their lives in South Africa.

A shaft will be erected in Bayview Park, New Haven, in memory of volunteers of the Ninth Connecticut Regiment. The contract has gone to Maxwell Bros., of that city.

The act of the Massachusetts legislature,

appropriating $25,000 for the Pilgrim Monument at Provincetown, has been signed by Governor Crane.

Kansas City is raising a fund for a police memorial tablet on the city hall. The money is coming in generously and a general sentiment is, being expressed in favor of a monument instead of a tablet.

Americans are asked to co-operate in erecting a statue in Manila in memory of Dr. Rizal, the Filipino patriot, author and poet, who was executed under the Spanish rule.

The Women's Relief Corps, of Potsdam, N. Y., is considering a proposition to erect a soldiers' monument in that town.

The village of Newtonville, Ont., will erect a monument in memory of Captain Milligan, who lost his life in South Africa.

The Union Ex-Prisoners of War will erect a $10,000 monument in the National Cemetery at Andersonville.

The commission for the McKinley memorial statue, to be erected in Springfield, Mass., at a cost of $15,000, has been awarded Philip Martiny.

Chesterfield county, Va., will erect a monument to the Confederate dead at Chesterfield Courthouse.

The Thomas Francis Meagher Memorial Association, of Anaconda, Mont., will be reorganized and begin an active campaign to raise $10,000 or $20,000 for a monument to the Irish-American soldier and territorial governor. Nearly $4,000 is already in hand for the purpose.

The contract for the soldiers' monument to be erected at South Bend, Ind., has been awarded to McDonnell & Sons, of Buffalo, at $22,840.

Dr. Henry V. Walls is president of an association which proposes to erect a triumphal arch of stone to Admiral Schley, in Baltimore.

Kansas City, Mo., has been collecting funds for the erection of a memorial tablet in honor of police officers killed in the discharge of their duty. The widow of one of the officers has now informed the authorities that under no circumstances will she consent to the placing of her husband's name on the tablet.

Geo. G. Barnard has been appointed sculptor for the new State Capitol at Harrisburg, Pa. Joseph M. Husted, of Philadelphia, drew the plans for the capitol, patterned after the National Capitol at Washington. The sum of $300,000 has been set apart for the sculpture, which includes a colossal bronze group below the base of the dome representing "The Apotheosis of Labor."

Danville, Pa., is meeting with encouraging success in raising a fund of $10,000 for a soldiers' monument.

After several years of work a committee has secured the sum of $8,500 for a statue of Dr. Martin B. Anderson, late president of the University of Rochester, N. Y. A contract for the statue will soon be awarded. The chairman of the committee is Adelbert Cronise.

J. B. Reinhalter & Co., of Philadelphia, have been given a contract by the Jermyn heirs to construct a $20,000 mausoleum of Barre granite at Dunmore, Pa., to contain the remains of the late John Jermyn.

The movement for the erection of a monument to the late Gen. F. E. Spinner is progressing. L. R. Whelpley, of East Capitol street, Washington, D. C., is in charge.

A display of sculpture by Miss Meta Warwick, a young American girl, at the Bing gallery in Paris, has attracted much attention among critics.

The Grand Army posts of Ohio are raising funds for the erection of a monument to General William H. Gibson.

Death of Philip Christa.

Philip Christa, the well-known marble man and sculptor of Detroit, died at his home on Fort Street, West, in that city of heart failure. Mr. Christa was born in Bavaria 71 years ago and studied sculpture in Munich. Although in latter years he had devoted himself to interior marble decoration, he always retained his love for his art. Mr. Christa came to this country when he was a young man and settled in Detroit. He opened a monumental shop, his first shed standing where the present City Hall is now. For twenty-five years he designed and executed monuments, many of the most artistic and beautiful memorials in the State still standing as testimonials to his skill and taste. Twenty years ago Mr. Christa gave up this branch of the business and has since conducted the largest marble mill for interior work in the State. His sons were associated with him in business, and the firm executed many important marble contracts, such as that of the Masonic Temple in Detroit. At the corner of Monroe and Farmer streets there are a number of marble slabs still in the pavement that formed a portion of a marble sidewalk laid by Mr. Christa when his shed occupied the City Hall site. Mr. Christa is buried in Mt. Elliott Cemetery, and is survived by three sons, Henry, John S. and Philip, Jr., and one daughter. For many years Mr. Christa was a subscriber to this magazine and a valued friend.

The Slate Trade

Two gin poles in the Fidelity quarry, at Pen Argyl, operated by C. Kitto & Co., collapsed recently. These have been replaced by new ones, and the quarry has again resumed operations.

The American Slate Company has pumped out the Aetna quarry, west of Pen Argyl, and will resume operations at once.

Some years ago a sixteen-foot bed of slate was found on the farm of Stewart Heller, near Wind Gap. This is now being prospected by Thomas H. Heller, and if the results are satisfactory a quarry will be opened by Philadelphia parties.

William Lobb's Sons have put the slate mill at their quarry at Rockville, Pa., in operation, and will develop the quarry extensively. An additional hoist will be installed.

A new slate quarry is being opened on the farm of Irving Herbert at Granville, N. Y. Several quarries have been opened there previously.

The Matthews Slate Company, of Middle Granville, N. Y., has been manufacturing red roofing slate for Senator Clark's new house. The slates are half an inch thick and are planed. They will be fastened to the roof with heavy screws and cement.

The Southwestern Slate Manufacturing Company, of Slatington, Ark., of which Curtis Wright, of Carthage, Mo., is president, has increased its capital stock to $10,000,000. The stockholders are principally eastern capitalists. The company has slate quarries at Slatington, and a railroad is to be built at once from there to Hot Springs, a distance of fifty-six miles.

William W. Jones, the president of the Quarrymen's Union, of North Wales, who has been an active quarryman for over fifty years, is in this country. He is endeavoring to interest Americans in the labor dispute between Lord Penrhyn and the striking slate quarrymen.

The slate business at Slatington is reported to be more brisk than ever before in the history of that region. A large number of the striking coal miners are employed in and about the quarries.

The Cambria Slate Company has been incorporated under the laws of New Jersey. Mr. George Blakistone, of the Union Trust Company, of Baltimore, is interested in the company, which intends to operate the slate quarries in the Peach Bottom Slate District at Delta, Md. The capital stock of the company is placed at $100,000. The company has acquired about 100 acres of land, and by the use of machinery it is expected to minimize the amount of waste and to convert the waste product into cement and for other practical uses.

The Ontalaunee Slate Company will at once enlarge its slate factory at Lynnport, Pa.

The Algonquin Red Slate Company has gained possession of the slate quarry recently operated in the vicinity of Truthville, N. Y., by G. H. Roberts, of Middle Granville.

The Hubert Slate Company, of Truthville, N. Y., is opening a quarry of black slate.

An account was recently given in these pages of the Newfoundland slate industry. The work of development has been done with English capital. While there is still great interest in the subject, the South African War and the excitement attending the preparation for the coronation have prevented much active work recently. It is indicated by those who are familiar with the trade that now that these are out of the way and that business is getting down to the normal again, greater attention will be given to the Newfoundland slate industry. A correspondent of the Montreal Gazette says:

"It looks as if the export of slate were about to become an important industry amongst us. A Welsh gentleman, Mr. O. J. Owens, arrived here on Monday last from Wales to commence the work of development on a newly-discovered slate quarry at Bay of Islands. He has a life-long experience in the work and after examining the property gave it as his opinion that it was the largest and most valuable deposit in the world. The original owner of the claim was R. G. Reid, railway contractor. He disposed of it to Mr. Owens on very reasonable terms, influenced principally by a desire to bring about mineral development along the line of railway and induce a large number of immigrants to come from Wales and help to build up and people this part of the country. Mr. Owens, in order to help on the furtherance of these views, has pub-

lished a book on the subject of Newfoundland's slate deposits in the Welsh language, and has circulated it widely among his countrymen. The slate quarry at Smith's Sound, Trinity Bay, is now a well-established industry, and is worked principally by Welshmen, who say there is a great future for slate in Newfoundland. Last year 2,000 tons, equal to 6,000 squares, valued at $22,500, were exported. It was shipped to London and Newcastle, where a ready sale at remunerative prices was obtained. The shipping facilities are remarkably easy and vessels of any size can lay alongside within a stone's throw of the quarry, and in perfect safety. The quarry is of immense proportions and there is sufficient material in sight to last for generations."

A Challenge Over Paving Blocks.

There has been a merry war over the granite block question in Worcester, Mass. In the first place, there has been great scheming on the part of the asphalt men to use that material, and the work of paving some of the most important streets has been held up. Then the mayor demanded immediate action on the part of the street commissioner toward repaving Main street with granite blocks. Early in the season bids were advertised for granite blocks for paving, and bids were submitted by the Webb Granite & Construction Co. and J. Bishop. The Webb bid was $1.65 a square yard and the Bishop bid was $1.55 a square yard. Mayor Fletcher believed these bids to be too high and rejected both of them.

When Main street was ordered paved Mayor Fletcher had contracted with the Webb Granite & Construction Co. for 30,000 blocks. The price asked was $1.61, but Mayor Fletcher paid $1.55 a square yard. This was for a granite block with a minimum length of nine inches and a maximum length of 13 inches, and a minimum width of 3¼ inches and a maximum width of 4¼ inches. In cutting the blocks the Webb Co. gave Worcester a block 10 to 14 inches long and 4 to 4¾ inches wide. These blocks lay 23 to the yard. This supply of blocks is nearly exhausted and work on the Main street pavement is held up on account of the scarcity of cement. For a new supply of blocks Mayor Fletcher made a contract with Morse & Eagan, of Montpelier, on a supposed basis of $1.45 a yard, although the contract price is $63.00 per 1,000 blocks.

Now President George D. Webb, of the Webb Granite & Construction Company, comes forward with the following challenge: If the city of Worcester has bought the paving for Main street at $1.45 per square yard, we will forfeit the sum of $5,000 for the benefit of the Old Ladies' Home, of this city. Furthermore, if the city of Worcester has not agreed to pay more money for the granite blocks to be used on Main street than we asked, we will forfeit an additional $5,000 for the benefit of the Old Men's Home of this city.

The Montpelier contract calls for stones of the following dimensions: From 8 to 12 inches long, with a good assortment of both, so that fitting can be properly done, as near 4 inches thick as possible, running between 3½ to 4¼ inches thick, and from 7 to 7½ inches in depth.

Mr. Webb claims that it will take 30 of the Vermont blocks to lay a square yard, which will make the price $1.89, instead of the $1.55 that was paid his company.

Rumors of a Big Stone Deal.

The Bloomington "World" says: One of the largest deals in the financial history of Monroe and Lawrence counties is now pending, and when consummated, John R. Walsh will become the owner of all the quarries of the Consolidated Stone Co., including the Perry, Matthews & Buskirk, near Bedford, and the big quarries in the Hunter Valley, northwest of Bloomington.

The Consolidated Stone Co. paid about $205,000 for the old Hunter quarry and the Norton property, $125,000 for the former and $80,000 for the latter. The company paid $300,000 for the Perry, Matthews & Buskirk. This quarry is the best paying in the district, but the old Hunter and Norton quarries are not as profitable now as when bought by the Consolidated Co.

The stockholders of the Consolidated are closely allied to the Monon management, and now that the road has come under the control of another company the Consolidated people want to sell out. When this deal is closed John R. Walsh will own three-fourths of the stone output in the Oolitic district.

Columns of Black and Green Marble.

The Westfield Marble and Sandstone Company, of Westfield, Mass., recently shipped to New York two beautiful polished columns of their "black and green" marble, and two more of the same sort are being finished. These are 15½ feet long and 26 inches in diameter, and are supplied with base and cap stones of the same material. They weigh about nine tons each.


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THE ABOVE SHOWS 2100 FT. SPAN ON
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Limes and Cements

M. U. Demarest, of Elkhart, Ind., has been appointed receiver of the Monolith Portland Cement Company, Ltd., which was to have built a large plant at Bristol, in the northern part of Elkhart County. The company was formed about two years ago, with a capital of $500,000. It had options on 500 acres of marl land and overflow land to provide for the construction of a big dam in the St. Joseph River.

The Martin's Creek, Pa., Portland Cement Company has increased its bonded indebtedness from $100,000 to $250,000, and will double the size of its plant. When the proposed improvements are completed it will have a capacity of 2,000 barrels a day.

F. C. Hawes, Sr., of Waukesha, Wis., has purchased lime kilns and stone quarries at Lannon, and will operate them at once.

J. H. Turner, James Allison and George M. Dickson will establish an artificial stone plant at Wichita, Kans.

The Red Canyon Stucco Company, of Keystone, South Dakota, has been incorporated with capital stock of $600,000. The incorporators are: George A. Clark, Chas. A. Clark, John T. Patten, Matt R. Haillew, Elmer E. Axford and W. H. Gates.

The Cleveland Concrete Building Block Company has been organized at Kittery, Me., with $150,000 capital stock to manufacture concrete building blocks and cement. President, C. C. Smith; treasurer, Mack P. Paul, both of Kittery.

The Seminole White Lime Company, of Oklahoma City, has been incorporated with capital stock of $25,000. The incorporators are M. H. Southworth, Springfield, Mo., E. Coady and W. H. Webster, Oklahoma City.

The Osborne Engineering Company has begun the construction of the new plant for the Midland Portland Cement Company, at Bedford, Ind. It will have a capacity of 2,000 barrels.

The plant of the Montreal Lime Company was destroyed by fire recently.

The lime business of J. J. Follett & Sons, at Adams, Mass., and that of Follett Bros., at Pownal, Vt., has been transferred to the New England Lime Co.

The Pittsburg Plate Glass Company, a large consumer of gypsum stucco, has purchased 40 acres of gypsum land in Walker Township, near Grand Rapids, Mich. It will erect large mills so that it can be independent of the plaster trust.

The Consolidated Cement Company is erecting a large derrick at Eddyville to hoist coal from barges.

The Rockland-Rockport Lime Company has installed machinery for hydrating lime. The material undergoes a secret treatment which enables it to resist the injurious effect of air and water.

The plaster mill, land and machinery of the Standard Cement Plaster Company, of Laramie, Wyo., has been purchased by the Acme Cement Company, of St. Louis. A complete new plant will be built.

The Zorn-Hornung Company, of Gibsonburg, O., has been succeeded by the Standard Lime Company, incorporated with a capital stock of $50,000. The incorporators are A. H. Lauman, F. C. Hornung, F. W. Zorn, A. Hornung, F. A. Zorn and G. W. Hornung

The Pittsburg Plate Glass Company has purchased forty-six acres of gypsum land in Walker township, Mich., and will probably erect a plant and manufacture stucco solely for its own use.

Cameron Bros. are building a large new lime kiln at Delta, Ont.

During June the plants of the Wolverine Cement Company, at Coldwater and Quincy, shipped 66,000 barrels of Portland cement. The Coldwater plant was shut down for a time, owing to lack of coal.

The White Star Portland Cement Company, composed of Detroit men, has increased its capital stock from $10,000 to $1,500,000.

The West German Portland Cement Company, of Lima township, Mich., has been incorporated with a capital stock of $1,000,000. The stockholders are Linus S. Leich and Homer C. Millen, of Detroit, and Wm. L. Leich, of Chicago.

The Red Canyon Stucco Company, of Keystone, S. D., has been incorporated with a capital stock of $600,000. The company owns immense deposits of gypsum in the Black Hills, in Fall River county, and will erect a large mill for the manufacture of plaster of paris and land plaster.

The Permanent Post and Fencing Com-

pany, of Cleveland, has been incorporated with a capital stock of $25,000, to manufacture fence posts and building material from cement.

The Chattanooga Lime Company has been incorporated at Chattanooga, Tenn., with H. H. Buquo as president. The company expects to consolidate the lime industry near Chattanooga, and has already bought the plants of the Thatcher Lime Company and J. D. Wooton, at Ooltewah, and the plant of W. F. Hale, at Graysville, Ga.

Messrs. William Wirt Clarke & Son, of Baltimore, furnished all of the Portland cement that has been used on the government printing office in Washington, deliveries having begun as long ago as August, 1900. The commissioners of the District of Columbia were so well pleased with the cement, which was of the Krause brand, that they proposed to give Messrs. Clarke an order for $40,000 worth of the same cement for the District requirements for the next twelve months. The factory was unable to accept more than half the contract, however.

The West Virginia Lime and Cement Works, with a capital of $25,000, is completing a plant at Kindricks, W. Va., for the manufacture of lime and cement. The company will also develop coal.

The Standard Lime and Stone Company, of Fond du Lac, Wis., has been incorporated with a capital stock of $25,000. Among the members of the company are Edward Lyons, of Eden, Charles Tesch, of Brillion, and W. A. Titus, formerly with Nast Bros., at Marble Head. The company owns 120 acres of land in Manitowoc County, on which there are 40 acres of limestone. The stone, which burns into excellent lime, is found in a ledge 50 feet high. Two large kilns will be erected this fall.

The project for a cement plant at Santa Cruz, Cal., has been abandoned. It was desired to capitalize the project at $3,000,000 and the money was not available.

The Buckhorn Portland Cement Company, of Camden, N. J., has been incorporated with a capital stock of $350,000 by Henry J. Kingsbury, W. L. Wien and Geo. H. B. Martin.

The Chazy, N. Y., Lime Company is building a new kiln. It will burn coal instead of wood.

The new mill of the American Plaster Company, at Watonga, Okla., is about completed and ready for operation.

The Alpha Portland Cement Company, of Philadelphia, has secured a majority of the stock of the Lehigh Power Company, of Easton, and now controls the big power plant of the latter corporation along the Delaware River, six miles below Easton. This has enough water to generate 1,000 horse power of electricity.

William Coyle, Harry G. Seip, Frank Reeder, Jr., William White, and George Coffin, of Allentown, Pa., are about to incorporate the Superior Portland Cement Company.

Machinery for the plant of the Great Northern Cement Company, at Marlborough, Mich., has been ordered, and it is expected that the company will be ready to manufacture cement in the early fall.

The Iola Portland Cement Company has announced its intention of enlarging its plant at Iola, Kan. The plant as it now stands has a capacity of 3,000 barrels a day and cost $1,000,000. It employs 400 men. The addition will cost $800,000, will increase the capacity to 5,000 barrels a day, and the number of employes to 650.

The Midland Portland Cement Company was incorporated last spring to erect a cement plant at Bedford, Ind. The company was capitalized at $1,000,000, with power to issue $500,000 in bonds. Of these bonds, $200,000 have been taken up by Indianapolis business interests, while the remaining $300,000 have just been placed with Louisville capitalists. The work of building and equipping the mills will begin at once. About 400 men will be employed. O. N. Packard, an Indianapolis banker, is president of the company, and Vinton O. Foulke secretary and manager.

The Southern Cement Company has leased the Ensley, Ala., plant of the Birmingham Cement Company, and will operate it hereafter.

The Consumers Plaster Company has been incorporated at Port Clinton, O., with a capital stock of $60,000. The company owns about ninety acres of the finest gypsum land in the vicinity of Port Clinton and will erect a large and complete plant at that place, employing 75 men. The incorporators are the following prominent plaster men: L. E. Fishack, of the Fishack Plaster Company, of Toledo; Alexander Forrester, of the Forrester Plaster Company, of Cleveland and Buffalo; W. M. Holmes, of the Crown Wall Plaster Company, of Braddock, Pa.; E. H. Fishack, of the Ft. Wayne plant of the Fishack Plaster Company, and L. G. Powell, of the Fishack Plaster Company.

The Century Carbonate Company, of Burlington, N. J., has been incorporated with a capital stock of $150,000 to manufacture cement, plaster, etc. The incorporators are: Harold B. Ayres, Richard Furst and Franklin C. Woolman.

Trade Notes

The Dobbie Foundry and Machine Company, of Niagara Falls, N. Y., has issued catalogue No. 10, devoted to improved contractors' and quarrymen's machinery. The special machines for which this firm is noted, descriptions and illustrations of which are given in this catalogue, are: Concrete mixers, steam hoisting engines, derricks and derrick parts, sheaves and sheave blocks, horse and hand power hoisting machinery, boilers, tanks and castings, rooter plows, etc. These are made of various sizes and of different approved designs. The company has been long established and has supplied much of its machinery to quarries and stone yards throughout the entire country. It has always enjoyed a good reputation for the excellence of its products and for fair dealing. The catalogue is a profusely illustrated publication of more than 200 pages. It will be sent to the address of any person upon request.

One of the most interesting and attractive catalogues we have seen is entitled "New York Rapid Transit Tunnel," illustrating the uses and application of Rand drills and Rand air compressors in centralized air power plants. This is issued by the Rand Drill Company, of 128 Broadway, New York, with branches in all of the leading cities and mining centers of the world. This is in no sense a catalogue in the ordinary acceptation of the term, but is a thorough and well-written account of the Rapid Transit Subway, handsomely illustrated with cuts showing the methods of construction that have been followed. The necessity for and the early history of rapid transit are first given, and then follows a discussion of the general construction, the excavation and materials, geology of Manhattan Island, the use of compressed air, and the special features of the work on the different sections. There is a double-page map in colors showing the growth of New York in the different centuries. The completed tunnel will be the greatest tribute to the value of compressed air in construction work in the entire world. The illustrations used in the pamphlet are admirably engraved and beautifully printed, and the publication is one that will be given a prominent place in engineering literature.

The plans for the new plant of the Cleveland Pneumatic Tool Company are about completed, and contracts will be let at an early day for the construction of the buildings. The company has just opened up an office at 411 Park Bldg., Pittsburg, Pa., represented by Chas. L. Nelson, and at 34 Lemoine St., Montreal, Canada, represented by N. J. Holden & Co.

The Jeffrey Manufacturing Company, of Columbus, O., issues a Special Price List, No. 62 A, that is devoted to the Jeffrey water elevators. These make application of the chain bucket system and the box elevator type to the hoisting of water, and are primarily intended for horse power, although steam, electric, gas or water power can be used if desired. It will be apparent that these systems are particularly suited for the hoisting of muddy water. The buckets are made of heavy galvanized iron, and there are absolutely no valves to be clogged or to get out of repair. The elevators are commonly used for wells from ten to thirty feet in depth, but the individual parts of the elevators, such as chains, wheels, shafts, etc., are heavy enough to permit extending the service to a depth of seventy or eighty feet. They are made in a number of standard sizes, and the horse powers are both single and double geared. It will be seen that these elevators would furnish an excellent solution of the difficult problem of draining a quarry that is not equipped with steam power, and that consequently cannot instal a pump of large capacity. The different standard sizes vary in capacity from 75 and 100 to 2,000 gallons per minute. A copy of this list, or of any of the catalogues issued by the company, can be had on application.

An attractive illustrated catalogue has been issued by the Passaic Quarry Company, with New York offices at 38 Park Row. The quarries of the company are at Avondale, N. J., in the Belleville district, only thirteen miles from New York City on the Newark branch of the Erie railroad, and four miles north of Newark. The stone from this neighborhood has been a famous building material for at least a century, and it is known far and wide as Belleville stone. It is found in two colors, a rich, bright gray shade in one ledge, and a blush-brown in the other. The quar-

ries have been worked for years, and there are large openings. The soundest and best beds of the stone have now been reached, and the company makes a specialty of sending no stone out except under a guarantee. Adjoining the quarries are large cutting sheds, equipped with the latest and most approved machinery. During the present year there has been installed one of the largest-sized Patch double platen planers, and there are two cableways in the quarry. The company has unusual shipping facilities, for besides its connection with the railroad, the mill is situated on the banks of the Passaic River, so that shipments of cut stone can be made to New York directly by water. The Belleville stone is hard and durable, although it is not a refractory stone to work. The gray stone has a crushing strength of 11,700 pounds, and the brown stone 13,310 pounds per cubic inch. The stone has been largely used in notable buildings in New York and vicinity, and the catalogue gives illustrations of structures erected wholly of this material. One of the most interesting illustrations shows the ruins of St. Joseph's Church, at Paterson, N. J., almost the only walls that remained standing after the great fire of February last. The entire interior was burnt to ashes, and yet the walls of Belleville stone are scarcely marred. The stone is not cracked, chipped or flaked, while other stone and brick buildings were left mere heaps of debris.

Gypsum in Oklahoma.

Prof. C. M. Gould has contributed several articles to this magazine, in the course of which he made reference to Oklahoma's vast gypsum deposits. A further investigation shows that these are of even greater extent that was supposed. A party from the Oklahoma Geological Survey, consisting of Messrs. Gould, Sherwin and Hefley, have been following up the line of gypsum hills in Northern Beaver and Southern Woods County. These hills form a continuous row from near El Reno on the south, to the head of the Medicine River in Barber County, Kansas, on the north. The hills are formed by two, or sometimes three ledges of massive white gypsum, averaging fifteen feet thick each, which outcrop on the top of the hills. From the level prairie to the east, these hills rise like a wall, extending north and south as far as the eye can reach.

Outside of the main body, the gypsum hills form buttes and flat-topped mesas, which often have distinctive names. Some of these are Cedar Hill, east of Watonga, Henguenet's Butte, on Salt Creek, near Ferguson, Mt. Heman, in Western Woods County and others. The famous Glass mountains are nothing but outliers of the gypsum hills between Cottonwood and Cheyenne Creeks. The northern part of the Glass mountains, Gray Eagle is a lone butte, 200 and more feet above the plain, composed of blood-red clay and capped with twenty feet of massive white gypsum, which being harder than the clay resists erosion and so forms the hill. West of the Glass mountains the creeks flowing northeast with the Cimarron have cut deep into the old plateau formed by the Gypsum ledges, and narrow valleys have been carved out to a depth of thirty feet or more. These valleys are contained between hills of red clay with precipitous sides, capped everywhere with the white gypsum. Standing at the mouth of a creek and looking up stream these canyon walls may be followed for miles and miles, until lost from view in the distance.

The divides between the creeks consist of the hills just mentioned. They are in fact long mesa-like ridges with steep sides and flat tops. At the end of the ridge near the Cimarron River, buttes are often formed. They were formerly part of the ridge and have been cut off by erosion. Good examples are the buttes a mile east of Granton between Pappoose Creek and Cheyenne Creek.

There is enough gypsum in these hills to supply the world with cement and plaster for a thousand years. The Glass mountains alone would run all the cement mills in America for generations.

A Great Marble Quarry in Oregon.

It is announced that the great undeveloped marble quarry of the Williams district, a few miles south of Grant's Pass, Oregon, will soon be opened up and worked on a large scale. The quarry has been located, partially worked, abandoned, and relocated a number of times. It has been found impossible to do anything with it in the past, owing to its distance from the railroad and the great cost of transporting the stone. A new railroad will pass through or near the district in which the quarry is located, and will furnish the needed transportation facilities. The quarry is said to contain an unlimited supply of marble of the highest grade and of almost every variety and shade except verd antique. At one place the marble forms a solid wall over 80 feet in height. The people back of the enterprise are southern Oregon men.

Contracts and Building

Government Work.

Annapolis, Md.—All of the bids for the erection of the officers' mess building at the Naval Academy have been rejected, because they greatly exceeded the appropriation for the purpose, $100,000. The lowest bid was $176,000 for the entire building, or $155,000 with Maryland granite.

Batesville, Ark.—The Secretary of the Interior has advertised for bids for the $70,000 federal building to be erected here.

Boston, Mass.—Extensive improvements are to be made at the Navy Yard, at a total cost of about $1,500,000. The work will include new wharfs and docks, new shops and a large traveling crane.

Boston, Mass.—The contract for the construction of the stone breakwater at the entrance of Apponegonsett harbor has been awarded to E. S. Belden & Sons, of Hartford Conn., at $1.07 for each ton of stone furnished and placed in the breakwater.

Fort Des Moines, Ia.—A total of eighteen buildings is to be erected by the government here. These will include officers' quarters, barracks, administration building, stables, etc.

Fort Snelling, Minn.—The government will expend nearly $300,000 on additional buildings here. The sum of $168,000 is available for the erection of barracks and quarters for one battery of artillery, and $30,000 for a grain storehouse.

Fort William, Ont.—Harbor improvements are in contemplation here at a cost of $1,000,000.

Monterey, Cal.—The new army post to be erected here for convalescents and soldiers returning from the Philippines will cost $125,000.

Superior, Wis.—The Federal Government will build at the harbor entrance here the largest monolithic concrete piers ever built in the United States. The foundations will be 25 feet below water level and the piers will extend 10 feet above the water. They will be of solid concrete and will be 3,200 feet long. It can readily be seen what an immense amount of crushed stone will be required. It is estimated that the contract will call for several hundred thousand barrels of Portland cement. Plans are being prepared by government engineers at Duluth, but bids will probably not be called for until the winter.

Washington, D. C.—The War Department has approved the plans of the board of engineers for a bridge across the Potomac to replace the old Long bridge. The sum of $996,000 has been appropriated for the work. Col. Charles J. Allen, U. S. engineer, reports to the War Department recommending that the Aqueduct bridge be re- [illegible] with new piers and abutments.

State, County and City Buildings, Hospitals, Etc.

Albany, N. Y.—The Superintendent of Public Works has awarded the contract for the construction of a sea wall between East Marion and Orient, L. I., to Joseph Hanigan, for $13,385. The work was authorized by act of legislature in 1901 and has twice been advertised. Both times, however, the lowest bid was greatly in excess of the engineer's estimate, and all were rejected. The last time it was advertised only one bid was received.

Benton, Ark.—Saline County will build a new Court House here of pressed brick and cut stone, at a cost of $30,000.

Boston, Mass.—Four new buildings will be erected for the women's department of the Boston Insane Hospital.

Dedham, Mass.—The County commissioners are to build probate and registry offices on High street. The sum of $200,000 is available for the purpose, having been set apart by the legislature. Eight bids for the work were received, but they were all rejected on the ground that they were in excess of this sum. The highest bid was from a Boston firm, and amounted to $360,894. The lowest bid was by Norcross Brothers, and amounted to $254,933. The proposals were for different varieties of Maine, New Hampshire and Massachusetts granites.

Granby, Quebec.—The County Council is considering the purchase of a road roller.

Grand Island, Neb.—The new court house to be erected here will cost $100,000.

Harrisburg, Pa.—Bids are wanted until Sept. 6 for the construction of the new capitol building. The plans are by Addison Hutton, Philadelphia.

Hartford, Conn.—An addition and improvements to the Hartford County Court House will cost about $90,000.

Houston, Tex.—Plans and specifications are wanted until Oct. 6 for a market house and city hall on Market Square, the cost not to exceed $100,000. O. T. Holt, mayor.

Jersey City, N. J.—The plans of Hugh Roberts, of this city, have been accepted for the four-story stone addition to the Snake Hill Insane Asylum. Cost $50,000.

Pikeville, Md.—A two-story brick and stone armory will be built for Troop A, of the National Guard, at a cost of $50,000. Plans by Wyatt & Notting, Baltimore.

Riverside, Cal.—The county will erect a court house costing in the neighborhood of $125,000.

Scranton, Pa.—Two buildings, out of four planned, will be erected for the county insane Hospital at Clark's Summit. The city will build a new fire and police station at a cost of $40,000, after plans by F. L. Brown. The city contemplates the erection of a manual training school at a cost of about $115,000. The architect has not been chosen yet.

Seattle, Wash.—The city is contemplating the erection of a crematory at a cost of $75,000.

Somerville, Mass.—A new battalion armory will be erected on Highland avenue. Plans for a $60,000 structure are being prepared.

Washington, D. C.—Additional buildings are to be erected for the Government Hospital for the Insane, and a group of buildings will be put up on the grounds of the Washington barracks, where the magnificent new building for the War College is to be erected.

Schools, Colleges and Libraries.

Ames, Ia.—Proudfoot & Bird, of Des Moines, have completed plans for a four-story steel and stone building for the Iowa State College here. It will cost $300,000.

Baltimore, Md.—All of the bids for the construction of the new dormitory building for St. John's College were rejected because they were not within the appropriation.

The Maryland Agricultural College has received an appropriation of $25,000 for a new dormitory, assembly hall and chapel building.

Chatham, Ont.—A physical laboratory will be erected at the High School.

Crisfield, Md.—An addition will be built at the high school for the use of the manual training department.

Dorchester, Mass.—Contracts have been awarded for a new primary school to cost $122,178.

Dover, Del.—New school buildings are to be erected here as an annex to the high school, after plans by Lewis R. Springer.

Greensboro, N. C.—A new students' hall will be built at the State Normal College at a cost of $20,000.

Halifax, N. S.—A south wing will be added to Mt. St. Vincent building.

Kansas City, Mo.—The Sisters of Loretto will have a great educational institution here, having acquired five acres of land for a site. Plans are being prepared for new buildings to cost upwards of $200,000.

Old Point Comfort, Va.—A large addition will be built at the Catholic Academy here, after plans by Thomas P. Kennedy.

Peterborough, Ont.—A new Collegiate Institute will probably be built here shortly

Providence, R. I.—The new building for the John Carter Brown Library of Americana at Brown University will be erected on George street, and will cost about $150,000. A new Y. M. C. A. building will be erected at a cost of about $75,000, as a gift from John D. Rockefeller, Jr. Plans are now being prepared by McKim, Mead & White.

St. Boniface, Man.—The Manitoba Government will erect a new Normal School of brick and stone at the corner of Nasseau and Messenger streets.

Salt Lake City, Utah.—Architect C. M. Neuhausen is preparing plans for an addition to All Hallows College, at Second, South and Fourth East streets, to be four stories high, and to cost $60,000.

Sheboygan, Wis.—Bids are asked until Sept. 8 for the erection of a public library building to cost approximately $35,000. A W. Pott, president.

Churches, Convents and Synagogues.

Annapolis, Md.—The German Lutheran church, recently burnt, will be rebuilt after plans by Otto Gottschall.

Baltimore, Md.—A church will be built for the David Rogers Mission on Columbus avenue. It will be of Port Deposit granite or Falls Road stone. George C. Haskell architect.

Plans have been drawn by Baldwin & Pennington for a new tower for the church St. Mary's Star of the Sea, the old tower having been destroyed by a storm.

Baltimore, Md.—St. Katherine's Roman Catholic congregation will build a new stone church after plans by Baldwin & Pennington.

Baltimore, Md.—The vestry of St. Michael and All Angels' Episcopal Church will erect a chapel on Huntingdon avenue, having just purchased a site. It will probably be built of stone.

Chester, Pa.—The congregation of the Immaculate Heart of Mary will erect a new convent, three stories in height, of brick and stone. Wilson Bros. & Co., Philadelphia, architects.

Easton, Pa.—The Olivet Presbyterian congregation will erect a new stone church, costing $50,000, after plans by Charles W. Bolton & Co., Philadelphia.

Kenosha, Wis.—The Dominican Sisters will rebuild their convent here.

Madison, Neb.—A new Catholic church, costing $20,000, will be erected.

Memphis, Tenn.—The Addison Avenue Cumberland Presbyterian Church will build a new edifice.

Morgantown, W. Va.—A new Methodist Episcopal Church and parsonage, of rock-faced stone, will be erected here, after plans by F. R. Comstock, New York.

North Des Moines, Ia.—An addition of brick and cut stone will be built at Westminster Presbyterian Church after plans by W. C. Barton.

Philadelphia, Pa.—The Bethlehem Evangelical Lutheran congregation will erect a new church at Thirtieth and Diamond streets. It will be of Gothic design, after plans by C. E. Rahn, and will be of Port Deposit stone, with Indiana limestone trimmings. Cost, $30,000.

Roanoke, Va.—A large hospital building will be erected adjoining the Catholic Church here, to be administered by the sisters connected with the church. The cost will be about $25,000.

St. Pierre Joly, Man.—A new parish church will be erected here at a cost of $150,000.

Bridges, Depots and Railroad Work.

Altoona, Pa.—The Pennsylvania railroad will make extensive improvements in the vicinity of this place, including new shops, etc. The estimated cost of the work is $2,000,000.

Boston, Mass.—The new Wellington bridge calls for 140 cubic yards of first-class stone masonry and 1,800 cubic yards of second-class stone masonry.

Buffalo, N. Y.—It is reported that the New York Central railroad will build a new station here, at a cost of about $1,000,000.

Columbia, Tenn.—The contract for the new station of the Louisville & Nashville railroad here has been awarded to A. E. Hawthorne, Nashville, at $80,000.

Danbury, Conn.—The New York, New Haven & Hartford Railroad will build a new union station here.

Danville, Ill.—The Chicago and Eastern Illinois will start at once on the erection of new engine and car shops here. The estimated cost of the improvements is $200,000.

Dansville, N. Y.—The Mill Creek Electric Light & Power Company has been incorporated, and will build a power plant on Mill Creek.

Estherville, Ia.—The Chicago, Rock Island & Pacific Railroad is expected to erect a $30,000 depot here.

Flemington, N. J.—A large stone bridge over Beaver Brook, between Highbridge and Lebanon, built in 1868, was blown up by dynamite by unknown persons recently. The officials had refused to replace it with a steel structure.

Gilroy, Cal.—Plans are being prepared for two new bridges near this place. Two sets of specifications will be prepared, one for stone and the other for steel.

Indianapolis, Ind.—The Southern Indiana Railroad has increased its capital stock to $3,000,000, and will build new branches in Lawrence, Greene and Sullivan counties to connect with new coal-fields and stone quarries.

Laird Station, Cal.—The McCloud River Electric Power Co. will build a masonry dam, 450 feet long, on the McCloud river, about 20 miles from this place.

Latrobe, Pa.—The Pennsylvania Railroad is expected to build a new station here.

Lead, S. D.—The Elkhorn Valley Railroad will build a passenger station of pressed brick and white sandstone.

Mankato, Minn.—The Great Western & Milwaukee Railroads will erect a union station here, costing $60,000.

Marshalltown, Ia.—The Chicago Great Western Railroad will build a new depot here.

Newark, N. J.—The Central Railroad of New Jersey will build a new steel bridge over Newark bay. It will be carried on seven masonry piers.

New Alexandria, O.—Bids are wanted by Douglass Bros. for grading 200,000 cubic yards on the Wabash line near this place.

Norristown, Pa.—The Pennsylvania Railroad will build a new station here on Lafayette street and make other improvements, at a cost aggregating $250,000.

Northville, N. Y.—George R. Finch, Glens Falls, and Elnathan Sweet, Rochester, are interested in the proposed dam across the Sacandaga River above this place.

Orange, N. J.—The Delaware, Lackawanna & Western Railroad has prepared plans for the elevation of its tracks through this place.

Playa del Rey, Cal.—The Beach Land Co. will erect a stone or cement arch bridge at this place.

Pembroke, Ont.—A stone bridge or a steel bridge, with stone abutments, will be erected at Eganville. The first bids received were too high and new ones have been called for.

Quebec, Que.—The Quebec Southern will extend its lines from this city to Sorel, a distance of 70 miles, where it will establish terminals.

Santa Fe, N. M.—The Atchison, Topeka & Santa Fe Railroad will reballast 1,776 miles of its tracks in California, Arizona and New Mexico.

Steubenville, O.—The Pittsburg, Cincinnati, Chicago & St. Louis Railroad will erect a $50,000 passenger station here.

Southbridge, Mass.—Akers & Taylor, of Charlton City, Mass., will build a new dam here.

Toledo, O.—It is expected that the new station to be built by the Toledo Railway and Terminal Company will cost at least $300,000.

Washington, D. C.—The Water Motor & Power Company has been organized in this city to utilize the power of the Potomac and Delaware rivers and other streams by means of a patent issued to William L. Walter, of Port Huron, Mich., whereby the power is developed by a series of paddles without the use of dams.

Business Buildings, Theatres, Hotels, Society Halls, Etc.

Beaverton, Ont.—A project is on foot to establish large cement works here. Capitalists of Lindsay are back of the scheme.

Brantford, Ont.—A large beet sugar factory will probably be erected here, if any local encouragement is given.

Buffalo, N. Y.—The Lackawanna Steel Company will build four new blast furnaces at a total cost of about $1,000,000.

Duluth, Minn.—A theater costing $50,000 will be erected on West Superior street, after plans by J. J. Wangenstein.

Helena, Mont.—Governor J. H. Toole will erect a residence after plans by J. H. Kent. The first story will be of porphyry with stone porch and trimmings.

Little Rock, Ark.—The Merchants' and Planters' Bank will build a new banking building.

Los Angeles, Cal.—H. P. Barbour will build a brick and stone hotel costing about $300,000. Plans are being prepared by Hunt & Eager, who will not be ready for bids until October.

Merriton, Conn.—The Charles Parker Company will build a new iron foundry on High street.

Minneapolis, Minn.—T. B. Walker will erect a six-story building of mill construction, brick and stone, at First avenue, N, and 6th street. Cost, $150,000.

New York, N. Y.—The Forty-two Broadway Company will build a twenty-story office building at this site, running through to New street. The lot is 116x197 feet, making this the second largest building of the kind in the city. It is to make profuse use of marble in the interior decoration. The architect is Henry Ives Cobb, and it will be built by the Fuller Company.

Paducah, Ky.—The City National Bank will build a six-story stone building at Broadway and Fourth street, at a cost of $100,000. The Masons and Odd Fellows will build a fraternity building on Broadway at a cost of $50,000.

Philadelphia, Pa.—Preston Butler will erect a new business building at 708-710 Market street, at a cost of $140,000.

Pine Bluff, Ark.—The colored Masonic Grand Lodge will build a temple here of brick and cut stone, at a cost of $40,000.

Prairie du Chien, Wis.—The erection of a large sanitarium and bath institution, to cost $100,000, is in contemplation here.

St. Louis, Mo.—E. G. Bruckman is at the head of a syndicate that will build a $250,000 hotel and theatre at Twelfth and Olive streets. Plans by Eames & Young.

Salt Lake City, Utah.—The Emery apartment house will be erected at South Temple and State streets, at a cost of $250,000. Plans by Architect Craig.

Seattle, Wash.—The Moore Investment Company will build a six-story brick and stone building at 1113-1125 Second avenue, to cost $850,000. Plans by Saunders & Lawton.

Welland, Ont.—The Canadian Steel Corporation, with a capital of $18,000,000, will erect an immense plant at this place.

Winnipeg, Man.—The Cockshutt Plow Co. will erect a four-story brick and stone warehouse, costing $50,000.

Worcester, Mass.—The Slater estate will erect a stone and iron building on Main street, between Pearl and Elm streets.

The heavy rains reported from all parts of the country have seriously interfered with quarrying operations in many sections. Pumps were utterly inadequate to keep the floods down so that work could be carried on. In addition to this many more or less serious wash-outs have been reported.

SITUATIONS WANTED.

Advertisements under this heading inserted for subscribers to STONE *free of charge. Advertiser must send 25 cents to pay postage, if replies are to be addressed in care of* STONE. *Rate to non-subscribers, 10 cents a line each insertion.*

WANTED—A position as foreman or superintendent of a cut stone plant. Thoroughly understands all kinds of stone working machinery, setting out work, etc. Have the best of references from firms for whom the advertiser worked eight and four years respectively. Address "Reed," care STONE Magazine.

WANTED—The advertiser is open for position as foreman. Twenty years in the business, five years running a steam stone yard. Am a practical stone cutter and mason; am posted on plans, pattern-making, best methods of getting out work, and estimating on cut stone work and masonry. Best of references. Address Henry Kershaw, 71st St. and Buist Ave., Philadelphia, Pa.

WANTED—A position, to take charge of a stone or marble plant. Twenty-five years' experience in quarrying and milling. Thoroughly conversant with machinery and best methods for developing and operating quarries, mines and mills. Address American, care STONE Magazine.

Marble Agent in Italy.

Intelligent young German, knowing thoroughly the whole Carrara district, with five years' experience, wants to undertake the wholesale purchase of rough marbles or statuary and other marble and alabaster works for a first-class American house; highest references. Write to "PURCHASER," Palazzo Sesti, Pietrasanta, Italy.

HELP WANTED.

Advertisements inserted in this department for 15 cents a line each insertion.

WANTED—Competent office man for marble works at quarries; must be a good draughtsman, experienced in computing estimates on all architectural marble, both interior and exterior; willing to live in the country; single man preferred. Apply, stating qualifications and salary expected, to Geo. B. Sickels & Company, Tate, Ga.

WANTED—Foreman for quarry crew, must be competent, energetic, and not over 25; familiar with derrick and quarry machinery, also able to handle men to advantage. Permanent position, with fair salary to start on, and good prospects for the future. Address "West," care STONE Magazine.

TO SELL. TO BUY. TO EXCHANGE.

Advertisements inserted in this department for 15 cents a line each insertion.

BUSINESS OPPORTUNITY.

An unusual opportunity is afforded for a practical and experienced Quarryman or cut stone Contractor to become associated in operating a Marble Quarry located in the northern part of New York. A solid deposit of sound marble appears on the surface and preliminary developments demonstrate an inexhaustible supply of both white and mottled marble. There is track connection with main line of railway, and product of quarry can be delivered at a low price. The quarry has been opened up by channeler, producing blocks of any size required. Some capital is now required to erect a sawmill, as there is quite a demand for such product. If preferred a corporation will be organized to conduct the business. Address F. W. HOYT, Publisher STONE.

FOR $2,500 cash will sell half interest in two-gang stone saw mill located in a booming town of 80,000. Only stone mill in district. Will only negotiate with practical stone cutter contractor capable of assuming entire management, whose reputation will bear investigation. Address "Business," care STONE Magazine.

FOR SALE—One Sullivan swivel-head channeler, in good condition; cheap, if taken immediately. Can be seen at our yard, Armory St. Bridge. J. P. Falt & Co., Cut Stone Contractors, Springfield, Mass.

FOR SALE AT A SACRIFICE.

A brownstone quarry, not far from Chicago. Address "Secretary," Builders & Traders Exchange, Chicago, Ill.

FOR SALE—Some fine pink granite quarries located near the railroad in North Carolina. The granite is a first-class building and monumental stone and is easily accessible. Good chance for a firm that handles large contracts in building and monumental work. Address the publisher of this Magazine.

A GRANITE QUARRY IN NEW YORK STATE.

A splendid opportunity for the development of a Granite Quarry in the eastern part of New York State, 75 miles from New York City; nearest point to L. R. 2½ miles. Easy grade, 25 acres exposed granite in sight free from minerals and surface seams. Has bed seams and rift, 5 great spurs, each different in color and texture, from fine grained dark blue to clouded resembling marble, with similar markings and make-up of Milford, Mass.

Write to confer, to open up in first-class shape, and consider terms.

Experts report supply inexhaustible, best up-to-date building stone—uniform and warm color, will quarry any dimension, breaks across the grain, chips off good, holds a corner, cuts, letters, takes a good polish, and granite enough to more than supply New York State and cities. Communicate with owner.

THEODORE WING, Plainfield, Conn.

MACHINERY.

FOR SALE—A splendid Aveling & Porter Road Roller, 15-ton, perfect condition, all complete, immediate shipment, inspection here. SPECIAL PRICE $900 cash, if taken promptly.

WILLIS SHAW—CONTRACTORS' MACHINERY

CHICAGO.

$500.00 CASH.

This sum will buy a good blue stone quarry of 70 acres at Summit, Schoharie County, N. Y. Address T. H. MAGILL, Schenectady, N. Y.

A BUYER'S DIRECTORY

...OF ...

The Stone Trades.

NOTE.—*The display advertisements of the firms mentioned under each heading can be found readily by reference to the Alphabetical Index.*

ABRASIVES.
Frenier & Son.
Harrison Supply Co.
Pittsburg Crushed Steel Co.

AIR COMPRESSORS.
McKiernan Drill Co.
Ingersoll-Sergeant Drill Co.
Rand Drill Co.
Sullivan Machinery Co.
Clayton Air Compressor Works.
Amer. Air Compressor Works.

AIR LIFT PUMPS.
Clayton Air Compressor Works.

AIR HOISTS.
Northern Engineering Works.

BARS.
Ingersoll-Sergeant Drill Co.
Lord, Bowler Co.
Sullivan Machinery Co.
Rand Drill Co.

BLASTING SUPPLIES.
Aetna Powder Co.
Ingersoll-Sergeant Drill Co.
Rand Drill Co.

BLOCKS.
A. Leschen & Sons' Rope Co.
Macomber & Whyte Rope Co.
American Hoist & Derrick Co.

BLUESTONE.
Genesee Valley Bluestone Co.

BOILERS.
John Maslin & Son.

BROWNSTONE.
Hummelstown Brownstone Co.

CABLEWAYS.
S. Flory Mfg. Co.
Lidgerwood Mfg. Co.
Trenton Iron Works.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

CAEN STONE.
G. P. Sherwood & Co.

COMPRESSED AIR SHOP TOOLS.
Clayton Air Compressor Works.
Thos. H. Dallett & Co.

CHAINS, STANDARD AND SPECIAL.
Jeffrey Mfg. Co.

CHANNELERS.
New Albany Mfg. Co.
Steam Stone Cutter Co.
Ingersoll-Sergeant Drill Co.
Lord, Bowler & Co.
Sullivan Machinery Co.
Rand Drill Co.

COAL MINE HAULAGE.
A. Leschen & Sons Rope Co.

CONTRACTORS' SUPPLIES.
A. Leschen & Sons' Rope Co.
Macomber & Whyte Rope Co.

CONVEYORS.
S. Flory Mfg. Co.
Jeffrey Mfg. Co.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

CONVEYING MACHINERY.
A. Leschen & Sons' Rope Co.

CORE DRILLS.
Sullivan Machinery Co.
C. F. Preslar Mfg. Co.

CORDAGE.
A. Leschen & Sons Rope Co.
Macomber & White Rope Co.

CRABS.
American Hoist & Derrick Co.
Contractors' Plant Mfg. Co.
Ingersoll-Sergeant Drill Co.
W. H. Anderson & Sons.
Rand Drill Co.
F. R. Patch Mfg. Co.

CRANES.
Northern Engineering Works.

CRUSHED STEEL.
Pittsburg Crushed Steel Co.

CHILLED STEEL.
Harrison Supply Co.

DERRICKS AND FITTINGS.
American Hoist & Derrick Co.
Ingersoll-Sergeant Drill Co.
Lincoln Iron Works.
Lord, Bowler & Co.
Sullivan Machinery Co.
F. R. Patch Mfg. Co.
New Albany Mfg Co.
Contractors' Plant Mfg. Co.
Rand Drill Co.
Gordon Foundry & Machine Co.
A. Leschen & Sons' Rope Co.

DREDGING MACHINERY.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

ENGINES.
John Maslin & Son.

ELECTRIC HOISTS.
Northern Engineering Works.

ELEVATING MACHINERY.
Jeffrey Mfg. Co.

EXPLOSIVES.
Aetna Powder Co.
Ingersoll-Sergeant Drill Co.
Rand Drill Co.

FEED WATER HEATERS.
Lord, Bowler & Co.

GASOLINE HOISTS.
Northern Engineering Works.

GRAPHITE GREASE.
Jos. Dixon Crucible Co.

GRANITE.
Arthur Lee & Bros.
C. E. Tayntor & Co.
Troy Granite Co.
Svenska Granitindustri Aktiebolaget.
Halmstads Stenhuggeri Aktiebolag.

GRINDSTONE MANDRELS.
Lord, Bowler & Co.

HEADERS.
Lincoln Iron Works.

HOSE.
Ingersoll-Sergeant Drill Co.
Sullivan Machinery Co.
Rand Drill Co.

HOISTS.
American Hoist & Derrick Co.
Brown Hoisting Machinery Co.
Contractors' Plant Mfg. Co.
Ingersoll-Sergeant Drill Co.
Industrial Works.
Lidgerwood Mfg. Co.
Lincoln Iron Works.
Sullivan Machinery Co.
S. Flory Mfg. Co.
Lord, Bowler & Co.
New Albany Mfg. Co.
Rand Drill Co.
Gordon Foundry & Machine Co.
F. R. Patch Mfg. Co.

HOISTING ENGINES.
Lord, Bowler & Co.
S. Flory Mfg. Co.
Ingersoll-Sergeant Drill Co.
Lidgerwood Mfg. Co.
F. R. Patch Mfg. Co.
Contractors' Plant Mfg. Co.
Rand Drill Co.
American Hoist & Derrick Co.
Brown Hoisting Machinery Co.

HOISTING ROPE.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

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American Hoist & Derrick Co.
Contractors' Plant Mfg. Co.
Lidgerwood Mfg. Co.
Lord, Bowler & Co.
F. R. Patch Mfg. Co.

JACKS.
Joyce, Cridland & Co.
W. H. Anderson & Son.

LARRYS.
W. H. Anderson & Son.

LATHES.
Lincoln Iron Works.
F. R. Patch Mfg. Co.
Gordon Foundry & Machine Co.

LIMESTONE.
Bedford Steam Stone Works.
The C. S. Norton Bluestone Co.

LOCOMOTIVE CRANES.
Industrial Works.
American Hoist & Derrick Co.
Brown Hoisting Machinery Co.

MINING MACHINERY.
Rand Drill Co.
Ingersoll-Sergeant Drill Co.
Lidgerwood Mfg. Co.
A. Leschen & Sons' Rope Co.
Jeffrey Mfg. Co.
Gardiner Electric Drill & Machinery Co.
Mine & Smelter Supply Co.
Marvin Electric Drill Co.
Northern Engineering Works.

MANILA ROPE.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

MALLETS.
W. H. Anderson & Son.

MARBLE.
Kennesaw Marble Co.
Northern N. Y. Marble Co.
Southern Marble Co.
Schweyer & Liess.
The Verd-Antique Marble Co.
The Georgia Marble Co.
Farmer & Brindley.
Arthur Lee & Bros.
D. J. Whitney.
Nya Marmorbruks Aktiebolaget.
Chester Goodale Marble Co.

MINERS' CANDLE WICK.
A. Leschen & Sons Rope Co.

PACKING.
A. Leschen & Sons Rope Co.

PLANERS.
F. R. Patch Mfg. Co.
Lincoln Iron Works.
S. Flory Mfg. Co.
New Albany Mfg. Co.
Gordon Foundry & Machine Co.

PNEUMATIC TOOLS.
Kotten, H. G.
Thos. H. Dallett & Co.

POWER TRANSMISSION MACHINERY.
Jeffrey Mfg. Co.

PUMPS.
The A. S. Cameron Steam Pump Works.
Ingersoll-Sergeant Drill Co.
Pulsometer Steam Pump Co.
Sullivan Machinery Co.
Maslins.
Rand Drill Co.
Gordon Foundry & Machine Co.

PUTTY POWDER.
Harrison Supply Co.
W. H. Anderson & Son.
Pittsburg Crushed Steel Co.

PULSOMETERS.
Pulsometer Steam Pump Co.

QUARRY MACHINERY.
American Hoist & Derrick Co.
McKiernan Drill Co.
New Albany Mfg. Co.
Contractors' Plant Mfg. Co.
Ingersoll-Sergeant Drill Co.
Industrial Works.
Lord, Bowler & Co.
Steam Stone Cutter Co.
Sullivan Machinery Co.
F. R. Patch Mfg. Co.
Rand Drill Co.
Macomber & Whyte Rope Co.
Gordon Foundry & Machine Co.
Brown Hoisting Machinery Co.
Gardiner Drill & Machinery Co.
Mine & Smelter Supply Co.
Marvin Electric Drill Co.
A. Leschen & Sons' Rope Co.

ROPE.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

ROCK DRILLS.
McKiernan Drill Co.
Ingersoll-Sergeant Drill Co.
Rand Drill Co.
Sullivan Machinery Co.
Gardiner Drill & Machinery Co.
Mine & Smelter Supply Co.
Marvin Electric Drill Co.

ROUGE.
Harrison Supply Co.
Pittsburg Crushed Steel Co.

RUBBING BEDS.
Lincoln Iron Works.
F. R. Patch Mfg. Co.
New Albany Mfg. Co.
Lord, Bowler & Co.
Gordon Foundry & Machine Co.

SAND PUMPS.
Frenier & Son.
Gordon Foundry & Machine Co.

SAND FEED.
Frenier & Son.
E. J. & O. H. Hawley.
Lincoln Iron Works.
F. R. Patch Mfg. Co.

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Lincoln Iron Works.
Sullivan Machinery Co.
F. R. Patch Mfg. Co.
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Jeffrey Mfg. Co.

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Lincoln Iron Works.
F. R. Patch & Co.

SLATE DEALERS.
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North Bangor Slate Co.

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Hummelstown Brownstone Co.
Portage Entry Quarries Co.
Minnesota Sandstone Co.
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Ingersoll-Sergeant Drill Co.
Sullivan Machinery Co.
Rand Drill Co.
F. R. Patch Mfg. Co.

STEEL EMERY.
Pittsburg Crushed Steel Co.

STONECUTTERS' TOOLS.
W. H. Anderson & Son.

STONE SURFACING MACHINES.
Thos. H. Dallett & Co.

STONE-WORKING MACHINERY
Lincoln Iron Works.
F. R. Patch Mfg. Co.
New Albany Mfg. Co.
Lord, Bowler & Co.
Thos. H. Dallett & Co.

TACKLE BLOCKS.
W. H. Anderson & Son.
Contractors' Plant Mfg. Co.
Ingersoll-Sergeant Drill Co
A. Leschen & Sons' Rope Co.
Rand Drill Co.
Macomber & Whyte Rope Co.

TRAMWAYS.
A. Leschen & Sons Rope Co.
Macomber & Whyte Rope Co.

TRAVELERS.
Lincoln Iron Works.
Lord, Bowler & Co.
New Albany Mfg. Co.
F. R. Patch Mfg. Co.

TRAVELING CRANES.
Lord, Bowler & Co.
Industrial Works.
Gordon Foundry & Machine Co
F. R. Patch Mfg. Co.
Brown Hoisting Machinery Co.
Northern Engineering Works.

TOOLS.
W. H. Anderson & Son.

TOOTH CHISEL & CUTTING MACHINE.
W. H. Anderson & Son.

TRUCKS.
Northern Engineering Works.

TURN-TABLES.
Northern Engineering Works.

WINCHES.
Contractors' Plant Mfg. Co.
Ingersoll-Sergeant Drill Co.
Lincoln Iron Works.
Sullivan Machinery Co.
Rand Drill Co.
F. R. Patch Mfg. Co.

WIRE ROPE.
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